UNIT 2   PROCESS OF KNOWING

Structure

2.1   INTRODUCTION

For generating new ideas and understandings, we have to constantly engage ourselves in the process of knowledge construction. By focusing on the process of creating ideas and carefully considering their value, we can become more skilled at thinking critically and creatively. Therefore, it is important that our learners are engaged thoughtfully in creating or generating new understandings. In the previous unit of the block, you understood about the concept of knowledge and various types of knowledge, now it is important that way of knowing to achieve the knowledge construction is also understood.

This unit throws light on the importance of constructing knowledge and also about process of knowing. A teacher is expected to train and help the learners in the critical evaluation of knowledge, so that they can see how different types of knowledge have to be judged in different ways. This allows them to evaluate new knowledge as they related to specific knowledge issues. There are different ways; by which learners can be initiated into the process of knowing will be discussed in the unit.

The last section of the unit will discuss the different methods which a teacher can adopt to promote knowledge construction in classroom.

2.2   OBJECTIVES

After going through this unit, you should be able to:

- explain the process of knowing;
- describe the various ways of knowing;
- discuss the process of knowledge construction in classrooms;
- explain the role of teachers in knowledge construction; and
- describe the various ways of constructing knowledge in classrooms.

2.3 PROCESS OF KNOWING

You would agree that in today's world, the knowledge and the capability to create and utilize knowledge are considered to be most advantageous to an individual. Knowledge develops through an individual's interactions with the world and with others about that world, resulting in an 'epistemic' or 'knowing' triangle. When individuals interact, each displays to the other their perspective on an object of mutual attention. This exposes them to different perspectives on the same topic or issue. Knowledge creation is dialectical process, which involves systemization of various facts through dynamic interactions between individuals and the environment. According to Wells and Arauz (2006), it has many advantages. First, when learners have the opportunity to share their views they are more likely to develop a stake in the process and therefore become motivated to grasp the concepts. Second, cooperative group work can be more productive than individual work. Third, group-generated knowledge can be a resource for individual understanding, and vice versa. Lastly, consistent with Piaget's views, it is within dialogic interactions that learners can revise their own perspectives in light of differing perspectives.

Knowledge creation is also a spiral process that goes through seemingly opposing concepts such as order and chaos, micro and macro part and whole, mind and body, tacit and explicit, self and other, deduction and induction, and creativity and efficiency. There is a need to understand that knowledge creation is a transcending process through which entities (individuals, groups, and institutions) go beyond the boundary of the old into a new self by acquiring new knowledge. In the process, new conceptual artifacts and structures for interaction are created, which provide possibilities as well as constrain the entities in consequent knowledge creation. Thus, knowledge creation is a cyclic process.

You have learnt in the previous unit that knowledge is contextual, which means that the same reality can be viewed differently depending on the context from which one sees it. It means that, in knowledge creation, one cannot be free from one's own context. The social, cultural, and historical contexts are important for individuals, because such contexts give the basis to individuals to give meaning to it. That is why, limited interaction with the environment and externalization of personal knowledge can lead to misconceptions. Therefore, teaching must be concerned with how we understand the process of the development of ideas and how we fit into that process. This can be done by asking why questions? why something happens. This kind of questioning and allows us to stimulates our thinking and also evokes the need for holistic ideas that help context and ideas that fill the enormous gap in our understanding.

From the above discussion it is clear that in knowledge generation, one tries to see the entire picture of reality by interacting with those who see the reality from other angles. Also, it must be understood that for knowledge generation, continuous interaction between individuals and social structures must take place. Out actions and interactions with the environment create and enlarge knowledge through the conversion process of tacit and explicit knowledge.

The process of knowing is a personalized, individual task that is influenced by experience and unintentional contextual cues. There are three aspects of knowledge – the knower (the consciousness of the participant), the known (the field of study), and the process of knowing (which connects the knower to the known).

There are many epistemological models operating in education, which proposes their own understanding about knowledge and process of knowing. For example, the positivist approach, see knowledge as quantifiable, measurable and testable. But, if we are concerned with the meaning of education i.e.it helps the learners to have different understanding about the concept, then we cannot impose to quantify and measure knowledge.

According realism, one derives meaning about the things through our sense-data. This means they believe that knowledge is directly related to perceptual consciousness. Thus, here perception is equivalent to truth and is universally assumed. By using this method of knowing, one would restrict the rich variety of human understanding and interpretation. On the other hand, Idealism believes that reality exists in the human mind; it promises diversity and individuality but does not believe in developing a shared understanding. Thus, the level of awareness of the knower determines the corresponding process of knowing, as well as the nature of the knowledge gained. Education must train the knower to use deeper levels of the mind to gain more useful and fulfilling knowledge. Thus, must help learners to become aware about them and stimulate their thinking to create knowledge based on their understanding about the world. Thus, knowing about the world or concept must be a reflective process and also contextualized.

Any theory that attempts to define the process of knowing is also required to explain as to how information is accessed, stored and retrieved in order to understand how learning takes place. Knowing begins with undifferentiated perception of personal space and time along with undifferentiated sensorial reactions to internal and external stimuli. With the acquisition of language and formulations of self differentiated entities are stored, recalled, imagined, and communicated with maximum contextual relevance.

2.4 WAYS OF KNOWING

In the previous discusssions, you might have understood that there are various valid ways to gain knowledge, which include perception, reason, logic and language. A child, from infancy to early childhood, relies heavily on sense perception for knowledge acquisition as it comes naturally to them. It is only after stepping into late childhood that the other three ways of knowing start taking place. By adulthood, the learners use a combination of all the four to acquire knowledge. Here, the influence of language in shaping thought is seldom noticed as it comes so effortless. Finally, the appeal of a well-constructed argument can be sensed even without any formal training in logic or other forms of reasoning.

A teacher is expected to train and help the learners in the critical evaluation of knowledge, so that they can see how different types of knowledge have to be judged in different ways. This allows them to evaluate new knowledge as they related to specific knowledge issues. There are different ways, by which learners can be initiated into the process of knowing, let us discuss them in some detail.

(i) Sense Perception

Perception is an active, selective and interpretative process of recording or becoming conscious of the external world through sense experience. These sensory experiences are primarily gained with our five senses: touch, taste, smell, hearing and sight. *For instance*, light reflects off a surface, stimulating our eyes forms a mental construction called as **the percept**. This construction is dependent on the brain's internal structures and strategies. In other words, we use what we already believe to be true about the world to categorize what we perceive. Thus, it is the most basic and immediate 'way of knowing', sometimes it might not be a very reliable source.

Here, it is important to note that perception and sensation are different; sensations are simple sensory experiences helping in awareness of qualities e.g., colour, sound, taste, odour, heat, cold, etc. through using sense organs. While perceptions are complex constructions of simple elements joined through association to form a meaningful experience.

Sense perception is a subjective activity hence it varies from individual to individual, depending upon one's innate abilities. Our intellect defines the limits of our sense perception. Our physical conditions, motivational dispositions and mental state direct our sense perceptions.

Advantages

* Since knowledge is based on observable facts and thus it is objective.

* Knowledge gained through this may be tested and verified by others easily.

Disadvantages

* All phenomenon are not observable

* We have limited sensory limits and thus can be mislead very easily (for example, optical illusions)

* Emphasis on objectivity may mask the influences of subjectivity.

(ii) Language

Language acts as a medium for conveying the knowledge from one individual to the other. It includes with agreed or conventional meanings combined according to a set of rules for the purposes of communication, formulation of ideas, storage of knowledge or as a medium of thought. It integrates knowledge acquired through varied sources at varied places. Language allows for articulating knowledge and integrating various dimensions of knowledge.

Language plays an important role in communicating knowledge because it carries the context which allows for meaning and recontextualization. When a well-structured argumented is presented, it comes to our notice very easily, in comparison to the one which is without any reasoning and logic. It also helps just not in describing our experiences but in structuring our experiences.

Language facilitates the process of knowing. Meaning which is a core element of knowing and it evolves through language. Language helps in drawing out the distinctions and in making categories. According to discourse theory, language is used in constructing reality. While knowing, one modifies the thinking which happens through social intractions. Different members in a social group, come from different contexts thus developing a better understanding of the world whenever a disputes arise over knowledge claims, what is at issue is not only

the facts of the matter, but also the logic or reasons given for acceptance of the facts, and the procedures used in reaching a conclusion. Through using language in our communications, the disputes can be resolved to gain a consensus.

(iii) Emotion

Emotions play a powerful role in shaping thoughts, influencing behaviour, and steering the pursuit of knowledge. While emotions may be a key to self-understanding and to understanding the world.

The emotions and their expression vary across cultures and hence knowledge can acquired through the use of emotions may not be reliable, it is subjective and less measureable. It can help as well as hinders in the process of knowledge construction. The training of emotions is a key factor in enhancing the teaching-learning process. Arousing positive emotions in the knower facilitates smoother transmission of knowledge. The teacher should help create positive emotions in the knower about the known. Curiosity and eagerness are the most essential ones.

(iv) Reason

If you want to understand what reason is, then it must understood that it is the ability to use logical deduction. This allows us to go from starting ideas (premises) to reach valid conclusions. Here's a simple example: Premises 1: Rex is a dog. Premises 2: All dogs have fur (remember this doesn't have to be true) Question: Does Rex have fur? Valid Conclusion: Yes Rex has fur. Going from premises to conclusions like this is called logical 'deduction'. It should be noted that the conclusions are not always true. What it means is that if the premises are true then the conclusions will be true. Here's another example. Premises 1: Suraj is a man Premises 2: All men have eight legs Question: Does Peter have eight legs? Valid conclusion: Yes, Suraj has eight legs. This might not be true, people don't usually have more than two legs. However, the conclusion is still logically valid because it follows from the two starting premises. When we use deductive logic above as we made general statements (about men and about dogs). With inductive logic we take a specific example to tell us something about the general. For example, you might have noticed that most windows are made of glass. We could say the following Step one: All the windows I have seen are made of glass 2: Therefore, all windows are made of glass. You might inter that because you've seen so many windows and they were all made of glass that all windows are made of glass. There's no way, one can prove that all the windows in the world are made of glass. The idea is just inferred from one's experience. This notion of inference helps.

Check Your Progress

Notes : a) Write your answers in the space given below.

b) Compare your answers with those given at the end of the unit.

1) Explain the role of language in knowing.

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2) How knowledge is derived according to realism?

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2.5 CLASSROOMS AS A SPACE FOR COLLABORATIVE CONSTRUCTION OF KNOWLEDGE

Before, discussing about how classrooms can promote collaborative construction of knowledge. Let us discuss about the various types of talks which takes place in a classrooms. Mercer (2008) proposed that classroom talk/discussions can be classified in three categories of talk—exploratory, cumulative, and disputational. According to him, exploratory talk uses questioning of one's own and others' assumptions, outlining reasons for claims, making explicit evaluations and critiques, and engaging in persuasion. When learners face challenges in the classroom they give reasons and offer alternatives, in this process, they refine and reconstruct their understandings.

Cumulative talk, by contrast, occurs when learners build a shared understanding and body of knowledge from the accumulation of agreed upon pieces of knowledge. Thus, this type of talk results in the development of knowledge by mutual agreement. Hence, the learners are accountable only to one another. Cumulative talk may appear to be cooperative interaction, given the valuing of others' contributions and the sharing of power and control that characterize such interaction.

Disputation talk is a highly constraining, competitive form of social interaction characterized by an "unwillingness to take on the other person's point of view, and the consistent reassertion of one's own" (Mercer, 2000, p. 97). Lack of engagement impedes participants from gaining new perspectives and insights. A central feature of disputational talk is thus its oppositional quality. Consistent with the negative emotional climate of disputational talk, participants actively seek to protect and maintain their respective individual identities as opposed to forming a collective identity. Thus, this type of talk lack the active engagement required for joint reasoning on the part of learners.

From the above discussion, it is clear that collaborative engagement in a classroom takes place where learners engage one another's ideas through joint or collective reasoning. The specific form of talk that helps in a collective interaction is *exploratory talk*. As a teacher, we must promote it in our classrooms for active construction of knowledge.

It is observed that learners construct knowledge most effectively in active social classrooms, where they negotiate understanding through interaction and varied approaches. Hence, if the learners are promoted to work in groups, there will be better collaboration in learning. Baker (2002) defined collaboration as "a symmetrical and aligned form of co-operation in problem solving independently of whether the participants agree or not". According to him, interaction is *symmetrical* if the participants adopt certain roles equally throughout the interaction, i.e. participate equally in problem solving.

Stahl (2004) described that collaborative knowledge construction is a cyclical process where individual's tacit understandings– related to phenomena, concepts or material tools available and relevant to understanding the topic under discussion – are made explicit, i.e. interpreted in the discourse. According to him, tacit knowledge refers to knowledge that individuals have but may not be able to put in words. Tacit knowledge may include, for example, an ability to use some physical tools or unstated background knowledge about the world, about other people and objects referred to in discussion.

During the process of collaborative knowledge construction, this tacit knowledge is made explicit, clarified and negotiated in an interpretive process, and as a result a shared understanding of the meanings is created. As discussion proceeds further this explicitly stated and negotiated shared understanding about any concept becomes tacit knowledge which can be used as a resource in developing understanding further.

Thus, you can derive from here that learning is viewed as an active process, in which there is construction of new knowledge rather than only reception of knowledge from the teacher to the learner. During this process, learners remain active, they apply current understandings, note relevant elements in new learning experiences, judge the consistency of prior and emerging knowledge, and based on that judgment, they can modify knowledge.

If you analyse the construction of knowledge in the context of your school then you would realize that whatever knowledge is constructed in the classroom, is with the help of teachers. They help learners to understand, investigate, and determine how implicit cultural assumptions, frames of references, perspectives, and biases within a discipline influence the ways in which knowledge is constructed.

During this process of knowledge construction, teachers must pay attention to two particular factors. First, they should consider the learner's zone of proximal development, which is the distance between the actual developmental level as determined by independent problem solving and the level of potential development and give learners the help they need in constructing new knowledge and meanings. Second, they should facilitate peer interaction and cooperation between learners, since the social and cultural context of learning is essential in constructivist philosophy.

The socio-constructivist perspective based on the Piagetian view of learning believed that individuals actively construct knowledge by a process of equilibration. This means that individuals aim to hold a consistent, equilibrated conception of their world. Knowledge construction takes when individuals accommodate present cognitive structures to represent the context in a better way. During this process of accommodation, the present knowledge structures or concepts are reorganised or new knowledge is constructed. From their viewpoint of learning, the state of disequilibrium of cognitive structures is important in enhancing the process of equilibration. But, in the Piaget view of constructing knowledge, the role of social interaction has been minimized. But, Piaget (1965, 1995) introduced the notions of cooperation and constraint as a way to describe forms of relationship/social interaction that differentially influence the development of knowledge. According to Wright (1982), cooperative relations involve mutual respect and such relations also help in developing a positive emotional climate of "mutual sympathy and affection". Piaget (1932/1965) argued that such

relationships were ideally suited for achieving mutual understanding and knowledge development.

Check Your Progress

Notes : a) Write your answers in the space given below.

b) Compare your answers with those given at the end of the unit.

3) State the importance of relationships in classroom in knowledge development.

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2.6 ROLE OF TEACHERS IN KNOWLEDGE CONSTRUCTION

Classrooms are seen as places where inquiry and co-construction of knowledge takes place. In the constructivist classroom, the teacher's role is to prompt and facilitate discussion. Thus, the teacher's main focus should be on guiding learners by asking questions that will lead them to develop their own conclusions on the subject. Parker J. Palmer (1997) suggests that good teachers join self, subject, and learners in the fabric of life because they teach from an integral and undivided self, they manifest in their own lives, and evoke in their learners, a capacity for connectedness.

You may also say that the teachers are the facilitators and who questions rather than transmit the information. The question raised by the teachers the classroom help in initiating discussion. The learners assume the role of questioner, syntheizer, and analyst. By asking questions, exploring, and assessing what they know, they become active learners. During this learning process, the learners develop their understanding about the concepts by finding and analyzing the relationships among concepts. They also relate and inter relate the form and content of knowledge of one area with another.

Here, each learner is actively involved in constructing her own understanding of the content. For example, while studying about respiration, learners construct meanings for terms such as diaphragm, trachea,lung, inhalation, and exhalation with the help of a lung model to better visualize these structures and provides evidence to support their understanding. Teachers can help Learners to experiment further with this model by observing how the lungs are affected by altering other variables associated with respiration and disease. Thus, a teacher has to encourage using multiple approaches to problem solving by providing opportunities for learners to share their strategies.

The shift in the teacher's role from a transmission mode of content to asking why questions, and encourages relational understanding. The focus point here for teachers is to make learners aware of why they create relationships among selected aspects of constructed reality. In this way, learners establish relationships between previous experiences and present experience. Learners understanding about the concepts can be assessed through their ability to communicate coherent

conceptions of the relationships by using a reasoned argument during discussions with the teachers and peers.

Learners control their own learning process, and they lead the way by reflecting on their experiences. This process makes them experts of their own learning. The teacher helps create situations where the learners feel safe questioning and reflecting on their own processes, either privately or in group discussions. The teacher should also create activities that lead the learner to reflect on his or her prior knowledge and experiences. Talking about what was learned and how it was learned is really important. For example, Learners keep journals in a writing class where they record how they felt about the class projects, the visual and verbal reactions of others to the project, and how they felt their own writing had changed. Periodically the teacher reads these journals and holds a conference with the learner to assess (i) what new knowledge the learner has created, (ii) how the learner learns best, and (iii) the learning environment and the teacher's role in it.

The teachers must ensure that a positive and supportive learning environment in which learners feel emotionally secure and able to challenge themselves cognitively. The teacher must be flexible and adapt to learners' individual interests and needs.

As teachers, we must encourage learners to constantly assess how the activity is helping them to gain understanding. By questioning themselves and their strategies, learners in the constructivist classroom ideally become 'expert learners'. This gives them ever-broadening tools to keep learning. With a well-planned classroom environment, the learners learn 'how to learn'. One might look at it as a spiral. When they continuously reflect on their experiences, learners find their ideas gaining in complexity and power, and they develop increasingly strong abilities to integrate new information. One of the teacher's main roles becomes to encourage this learning and reflection process

Example: a group of learners in a science class are discussing a problem in physics. Though the teacher knows the 'answer' to the problem, she focuses on helping learners restate their questions in useful ways. She prompts each learner to reflect on and examine his or her current knowledge. When one of the learners comes up with the relevant concept, the teacher seizes upon it, and indicates to the group that this might be a fruitful avenue for them to explore. They design and perform relevant experiments. Afterward, the learners and teacher talk about what they have learned, and how their observations and experiments helped (or did not help) them to better understand the concept.

Learners build strong conceptual frameworks when teachers help them assess and clarify prior knowledge; facilitate environments through active learning activities that interconnect ideas and vary approaches to knowledge; and invite learners to reflect, co-build course road maps, and pursue other forms of metacognition.

Thus, a teacher has to provide such a learning environment that helps in solving the inconsistencies between learners' current understandings and the new experiences before them. The challenge here is that a teacher cannot assume that all children understand something in the same way. Therefore, she has to provide different learning experiences to satisfy different levels of understanding of the learners.

You may conclude to state the following points about the role of teachers in constructivist classrooms:

- Teachers employ techniques which can encourage group interaction, where the leaners get a chance to become explicit about their own understanding by comparing it to that of their peers.

- The teacher should inter-relate concepts, subjects and activities across the curriculum so that what is learned in one activity gets strengthened and reaffirmed in another (Integration of Concept).

- promote active learning with hands on activities that emphasize process

- provides a range of activities with case discussion, teacher challenges students to reach beyond the simple factual response. Learners are encouraged to connect and summarize concepts by analyzing, predicting, justifying, and defending their ideas.

- Student autonomy and initiative are accepted and encouraged. By respecting students' ideas and encouraging independent thinking, teachers help students attain their own intellectual identity. Students who frame questions and issues and then go about analyzing and answering them take responsibility for their own learning and become problem solvers.

- recognizes that learning takes place in a social context and utilizes the context to support understanding

- develops concepts from real world problem situations and integrates problem solving and higher order thinking skills into subject matter units rather than teaching these skills in isolation.

- Provide Scaffolding which is a more systemic approach to supporting the learner, focusing on the task, the environment, the teacher, and the learner. Scaffolding provides temporary frameworks to support learning and learner performance beyond their capacities. Effective scaffolding requires the teacher to:

  - ✓ Inquire into the learner's understanding of concepts, exploring misconceptions and untrue ideas

  - ✓ Encourage dialogue between learners and teachers to develop understanding

  - ✓ Provide opportunities to learn through questions and through peer exchange

  - ✓ Seek elaboration of learners responses and justification for opinions.

Check Your Progress

Notes : a) Write your answers in the space given below.

b) Compare your answers with those given at the end of the unit.

4) Why teachers must pay attention to ZPD in knowledge construction?

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5) State any two important role of teachers in knowledge construction.

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2.7 METHODS PROMOTING KNOWLEDGE CONSTRUCTION IN CLASSROOMS

In the classroom that follows constructivist approach, learners work primarily in groups, and learning and knowledge result from the dynamic interaction in the group. There is a focused emphasis on social and communication skills, as well as collaboration and exchange of ideas among the group members. Contrary to the traditional classroom in which learners work primarily alone and learning is achieved through repetition wherein the subjects are strictly adhered to and are guided by a text book, in constructivist classrooms various active learning activities are encouraged. Thus, the focus of classroom instruction should be on helping learners to learn and experience this process. This implies that the learning activities must be planned that provide opportunity to construct ideas, connect them to other content, and internalize understandings.

Activities that require learners to generate ideas typically include one (or more) of the following:

- **Interpretation** – means drawing inferences beyond the literal meaning. For instance, learners might read a description of a historical period and infer why people who lived then behaved as they did.

- **Analysis** – means identifying relationships among the parts of a whole. Learners might investigate local environmental factors to determine which are most likely to affect migrating birds.

- **Synthesis** – means identifying the relationships among two or more ideas. Learners might compare and contrast perspectives from multiple sources.

- **Evaluation** – means judging the quality, credibility, or importance of data, ideas, or events. Learners might read several accounts of an event to determine which they find most credible.

A teacher can use a variety of teaching methods to achieve the objective of knowledge construction in classrooms. Let us now discuss them.

(i) Expository Teaching

The teacher presents the subject matter and directs the learners through the lesson. A rule is presented with an example and then practice is provided. The teacher focuses the learners' attention on the key points of the subject and may use graphics, diagrams, or other representations to elaborate on the subject. Examples include pictorial relationships, application of the rules, context through historical information, and prerequisite information. Such examples are provided to give contextual elaboration and to help learners see the subject matter from many different perspectives.

(ii) Guided Exploration

In guided exploration, problems can be incorporated into lecture, laboratory work, and field courses. They fit beautifully into the exploratory phase of the learning cycle approach to teaching and work best when they are assigned before any lectures or readings on the topic.

For example, while beginning study of the Periodic Table of Elements. You might start with activities that involve determining patterns and classification. You may ask your learners to arrange the following substances in a meaningful order based on their properties" of color, number, and stars.

Learners will most likely come up with more than one way of arranging the substances and the strengths of various arrangements can be debated. There is no one "right" way of arranging these facts, but some arrangements may prove to be more useful than others. If an unknown substance was missing from the arranged pattern (or a gap appeared in the pattern), many of it's properties could be hypothesized. Then, you can ask them to study the development of the Periodic Table to come at a valid conclusion. Through this, learners are introduced to it as a useful tool for understanding the elements, their properties, and as an aid for understanding chemical reactions.

During this process of exploration, you have to use strategically prompts, cues, questions, direct explanations, and modeling to guide learner thinking and facilitate an increased responsibility for the completion of a task to foster deep learning.

(iii) Cooperative/Collaborative Learning

The constructivist classroom relies heavily on collaboration among learners. There are many reasons why collaboration contributes to learning. The main reason it is used so much in constructivism is that learners learn about learning not only from themselves, but also from their peers. When learners review and reflect on their learning processes together, they can pick up strategies and methods from one another.

In this method, each member of a team is responsible not only for learning what is taught but also for helping teammates learn, thus creating an atmosphere of achievement. Learners work through the assignment until all group members successfully understand and complete it. Cooperative efforts result in the participants striving for mutual benefit so that all group members gain from each other's efforts.

Example: In the course of studying ancient civilizations, learners undertake a project on archaeological dig. As the learners find different objects, the teacher introduces classifying techniques. The learners are encouraged to (i) set up a group museum by developing criteria and choosing which objects should belong, and (ii) collaborate with other learners who worked in different quadrants of the dig. Each group is then asked to develop theories about the civilizations that inhabited the area.

(iv) Inquiry or Problem-based Learning

In this type of learning, the learner attempts to investigate questions, scenarios, often assisted by the teacher. This approach puts learner's questions, ideas and observations in the centre. Inquiry-based learning concerns itself with the creative approach of combining the best approaches to instruction, including explicit instruction and small-group and guided learning, in an attempt to build on learners'

interests and ideas, ultimately moving learners forward in their paths of intellectual curiosity and understanding.

For example, while studying about seed germination, learners study various factors affecting germination in a whole group and small group setting. The whole class has a prior learning experience of growing seeds in a plastic Bag. In small groups, factors affecting germination are studied. One group studies how the amount of light affects seed germination, another groups studies the temperature, and another group studies how different types of seeds germinate under similar conditions.

After experimenting, each group shares the results of their observations with the whole class. A list of factors affecting seed germination begins to emerge from the whole group discussion. Each learner has a contribution to make to the discussion. Each learner has experience upon which to construct their ideas about seed germination.

In both of the preceding examples, when the teacher returns to the whole group discussion, it is possible that some learners' hands will shoot up to answer questions, while other learners do not seem to participate. Although it appears that all learners have an equal opportunity to participate, individual differences among learners in their willingness to speak in front of a group, their self confidence, their learning styles, or other differences, may make this learning scenario favor some learners over others. It is important that the teacher know strategies to encourage all learners to participate. Effectively using wait time, so that learners are given the time they need to construct answers and think about the questions posed is critical for equitable participation. Allowing learners to express their knowledge in non-verbal ways (writing, drawing, drama) also will encourage greater participation. There are many other teaching strategies which help all learners learn. The constructivist teacher effectively utilizes a wide range of these strategies to encourage active learning.

(v) Anchored Instruction

The anchored instruction approach is an attempt to help learners become more actively engaged in learning by situating or anchoring instruction around an interesting topic. The learning environments are designed to provoke the kinds of thoughtful engagement that helps learners develop effective thinking skills and attitudes that contribute to effective problem solving and critical thinking.

Anchored instruction emphasizes the need to provide learners with opportunities to think about and work on problems and emphasizes group or collaborative problem solving.

There is often a believe that seasons change based on the earth's proximity to the sun. In reality, seasons change as the earth tilts toward or away from the sun at different times of the year. To counter this misconception, a teacher can implement a Think-Pair-Share activity. Where, first, she asks learners what causes the seasons, in order to assess their prior knowledge and potential misconceptions. Learners then pair with a partner to discuss answers and share as a class. The teacher then presents a well-organized lesson on this topic directly addressing the misconception. Learners again pair and explain the seasons. Learners harboring the misconception may experience cognitive dissonance during the activity as they learn. Further activities continue to restructure and confirm their knowledge.

2.8 LET US SUM UP

In unit, we have discussed about the process of knowledge construction. It is argued that Knowledge construction is a dynamic process, which involves continuous dialogue and practice. There is interplay of the knower, the content and the process of knowing, which results in knowledge construction. The different ways of knowing which include: sense perception, language, reason and emotion. The learners keep using any of these ways to acquire knowledge. The role of the knower and the known in the process of knowledge construction thus becomes crucial.

For acquiring the knowledge, one has to be an active learner, who has to continuously strive to get new knowledge. Thus, in the classroom, teachers have to provide such opportunities to the learners which help them to actively involve themselves in the process of learning. It is discussed in the unit, how the relationships in the classrooms can yield a respect and develop an environment of active learning in the classroom. It is discussed in the unit that how Constructivism can help in making learning an active and constructive process. Learners actively construct or create their own subjective representations of objective reality. In the end of the unit, various methods which a teacher can adopt including direct instruction, expository teaching, guided exploration; cooperative/collaborative learning, inquiry/problem based learning etc. have been discussed.

2.9 UNIT-END EXERCISES

1. Observe any classroom where teaching is done through constructivist approach, and make a report of the strategies teacher used to generate ideas in classroom.

2. Analyse the role of a teacher in the construction of knowledge.

2.10 ANSWERS TO CHECK YOUR PROGRESS

1. Language helps in communicating knowledge. When a well-structured argument is presented, it is understood easily. Through language we can, describe our experiences and structure our experiences.

2. In realism, individuals derive meaning about the things through our sense-data.

3. Cooperative relations involve mutual respect and such relations also help in developing a positive emotional climate of mutual sympathy and affection. Such relationships helps in achieving mutual understanding and knowledge development.

4. ZPD helps the teachers in analysing the distance between the actual and potential development. If a teachers knows the ZPD of a learner, then she can formulate her strategies in such a way that a learner can achieve the potential development.

5. a) Promote active learning

   b) encourage learners to analyse, predict and define their ideas.

6. Activities which include interpretation, analys is synthesis and evluation.

7. It is an approach which helps in solving problems through investigating questions and ideas.

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