Chapter 1

INTRODUCTION

CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

Education, as it is generally understood today is nothing but preparing people for life. It is conventionally seen as a highly structured exposure to planned learning so that the learners would acquire the required knowledge, skills and attitudes for living life efficiently and effectively. Much of what people learn, are the result of this interaction with both their physical and social environment around them. From the time of their birth, individuals are exposed to the environment. As they listen to what is spoken around or watch objects, they begin to take in details pertaining to them. When what is perceived is organized into coherent whole, they begin to understand. What is understood is retained. As a result of this type of retention, knowledge and skills are acquired in an informal manner. As Piaget (1972) notes, through the processes of assimilation and accommodation they keep on adding to their world knowledge. However, this sort of informal learning is a slow process. It would take a long time for people to learn all what they need to learn. To overcome this difficulty and to help people acquire knowledge and skills they require, formal system of education was introduced. Thus people generally learn, both through informal and formal ways.

Apart from the informal and formal systems of education, there is yet another agency that is at work today to provide people with education. Many people owing to one or the other reason fail to get the formal education. To provide such people opportunities, open schools and universities have been established. Unlike formal system of education, no strict rules are being followed to get admitted into this type of open institutions. These organizations prepare their own study materials and supply the learners with them. These materials are self-contained and learners can learn on their own at any place and time convenient to them. There is no face to face instruction in these organizations as in the case of formal ones. However, in case, the learners have problems in understanding, counseling sessions are made available to

make their doubts clear. So there are three types of agencies at work to provide learners with opportunities for learning.

In spite of this, education today is encompassed by several problems. The world we live in today has seen during the last four decades, much more changes than it had seen from that period back to its inception. As Copa and Pease (1991) note, factors such as expanding role of technology, changing job demands, increasingly global inter-dependence of people, world wide competitions and markets, ecological concerns and growing demand for improved system of education, shifts in the make up of the labour forces, etc. are contributing in a big way to the drastic and pervasive changes that are taking place all over the world. The world we live in therefore is marked by continuous growth of knowledge and its application. This has brought about many changes in all spheres of life and this has dramatically altered the life style of people all over the world. As a result, more than ever before, people of today use sophisticated tools and machinery both in their professional and personal lives.

As a result, the required work and social skills are becoming more and more complex and sophisticated day-by-day. Traditional knowledge and skills are no more capable of coping with the changing needs of the changing times. People are left with no alternatives but change or perish. The skills and knowledge that seem to be relevant today are becoming obsolete and outdated within a short span of time. Old skills and knowledge are being replaced by new knowledge and skills. Under these circumstances, people are compelled to keep on learning. People are therefore forced to be lifelong learners.

As Erickson (1995) notes, people in general, among other things, need higher order skills, technological competence, self-learning ability. In the same way, Sternberg and Gregoren (2007) also note the need for learning to learn skills or self-directed learning. They note that the people of today confront a world of changing technologies, changing economies and changing job demands where permanent positions are being replaced by short-term contracts. Ongoing full-time jobs are being replaced by projects and field- work. In real life, no long-term mentality means that individuals must constantly look for jobs, keep moving and be flexible,

innovative and resourceful. This implies that individuals can no longer go on with the knowledge and skills they have picked up in schools and universities. If they are to meet the challenging needs of the changing times, they have to continue learning throughout their lives.

As it is seen, the existing knowledge and skills become irrelevant and as a result, individuals have to change job skills several times in a life time. As Mc Clusky (1974) puts it, it is impossible to provide the youngsters with a set of vocational skills which will serve them throughout their lives. Unfortunately, schools and colleges also do not make any attempt at inculcating learning to learn skills among their students. When people find their skills and knowledge outdated, they may not easily find experts waiting around them to help them overcome the situation. Under such circumstances, people are left with no choice but learn the learning to learn skills. Only when people are made educable they can be autodidactic and become self-directed learners. To make people autodidactic and self-directed learners is no simple task.

A person who is educable is one who has attained certain level of capacity for self-learning. As Cropley and Dave (1978) observe, when an individual attains the capacity for self-learning, self-evaluation as well as positive attitude to learning, desire for continued learning and a self-image as a learner, he or she can be considered educable. Cropley and Dave continue to note that educability means possessing of appropriate learning skills such as the ability to set oneself learning tasks, to make use of the resources available for carrying them out and to judge whether or not results meet the needs of the situation.

Only when people develop basic educability, they can be autodidactic. As Dermazedier and Gisors (1983) state, when such factors as appropriate levels of motivation, positive attitude, self-definition of oneself as a learner, belief in one's own ability to learn, etc. are sufficiently developed, an individual can be autodidactic. When all these qualities are available in an individual, he or she can become a self-directed learner. In self-directed learning, learners do not learn simply for the sake of learning. In it, they are playing the role of both the teacher and the

learner. In self-directed learning, the learners will find ways of meeting them. Self-directed learning is thus a way of learning in which the learners set their own goals for their own performance and devise learning strategies.

Learning to learn or self-managed learning as Megginson et al. (2001) state is the most fundamental learning of all. As Hudgson et al. (1998) observe, the ability to learn and become masters of one's own learning is the most important critical issue for the 21st century. As Megginson et al. (2001) and Cottrell (2003) observe, the benefits that self-directed learning or self-managed learning can shower forth are not few. As they observe, learning is the key to developing a person's potential and learning to learn is the key to effective learning. The capacity to learn to learn is an asset that never becomes obsolete. Self-directed learning enables the individual to meet the demands of change. It also gives people more choice about when and where to study as well as how to study. In addition, it makes learning more effective and enjoyable.

Further, there is no doubt that the quality of a nation depends upon the quality of its citizens and the quality of the citizens is greatly dependent on the quality of their teachers. The teachers of today are considered as facilitators of knowledge and not dispensers of knowledge and skills. This implies that teachers are supposed to help learners to learn on their own, so that they can become independent learners and thus take responsibility of their own learning. Since the students enrolled in teacher-education programs are the future teachers of the nation, the investigator felt that they are the most appropriate candidates to be equipped with learning-to-learn skills. Moreover, by developing self-managed learning skills among student-teachers, they will be better equipped to transmit the same knowledge and skills to their students and thus turn out to be producers of life long learners. Thus a study that focuses on developing self-managed learning skills among student-teachers is an issue that needs due attention.

As it has been already discussed, existing knowledge and skills are becoming obsolete within a short span of time and new knowledge and skills are taking their place. Under these circumstances, if the required knowledge and skills for self-

learning are identified, organized and developed into a strategy and made available to people, they will be able to learn on their own and continue to live efficiently and effectively. So development of a strategy of this kind was thought important. The present study is an attempt in this direction. However, before embarking upon the evolvement of the strategy, it was thought relevant to discuss at length what learning is, what are the different ways in which people learn, the different theories of learning are, components of effective learning, etc. In what follows, learning is discussed in its historical perspective.

1.2 LEARNING IN HISTORICAL PERSPECTIVE

As it is generally known, humanity in its course of evolution has undergone several stages. As it can be well presumed, there had been some sort of education going on at all stages. It is pertinent here at least to look at education during the nomadic days, education during settled life, and education in the gurukula days.

Education During Nomadic Days

As it can be generally understood, education and learning, to begin with, was a symbiotic process. As the father went to the forest for hunting animals, gathering fruits and digging out roots he took with him his sons and taught them the art of hunting animals, gathering fruits and digging out roots. Meanwhile, the mother stayed back and taught her daughters all that she needed to be taught. In this way, the parents taught their children all what needed to be learned. In those days, the knowledge and skills needed were very limited.

Education During Settled Life

Once humans started settled life and began agriculture, their education began to take another form. Settled life and agriculture gave them a lot of leisure time as they did not have to struggle as in their nomadic days. People began to live in groups. During leisure time, they indulged in various social activities like sports and games, etc. In the course of time, people with leadership qualities, began to exercise their control over others. As a result, kings and nobles came into existence. During the days of their settled life, they taught their children skills for carrying out agriculture, maintaining home, etc.

Education During the Gurukula Days

In course of time, the kings and nobles wanted their sons to be educated. They put them under the care of people who were known for their knowledge and wisdom. This system of education known as gurukula system of education, in course of time became more systematic. The children stayed with the guru in his residence. The guru taught them skills and attitude. In those days, people did not need as much knowledge and skills as required today. The learners left gurukulas only when their education was completed. The education they got there was enough to lead a good life.

Education Under the Corporate System

The gurukula system of education continued for long. However, by the middle of the 19th century, more pupils than the gurukula system could hold, came forward for learning. To accommodate them all, the corporate system known as schools and colleges were set up. With this more and more children began to attend schools. Looking into the needs of individuals and groups, curricula was prepared and experts called teachers were appointed. With all this, education became more formal. Education in the corporate system, unlike those in the informal ways of learning, was not natural but artificially created for the purpose of exposure, so that children would learn.

As education and learning became common, scholars became more curious and wanted to explore what happens when learning takes place. Many of them have come out with their own definitions of learning and what happens when learning takes place.

1.3 DEFINITION OF LEARNING

Nothing is so natural to us as learning and accomplishment are. Although learning is an important topic in present day psychology, it is an extremely difficult concept to define. To learn, as the Oxford English Dictionary defines it, is to gain knowledge or skill in a particular field. According to Wikipedia, the free online encyclopedia, learning is acquiring new or modifying existing knowledge, behaviours, skills, values or preferences and may involve synthesizing different types of information.

Both these definitions emphasize the results of learning rather than the process itself. The American writer, Peter Senge (1990) is critical of the view that equates learning with the taking in of information; an act which he believes is only distinctly related to real learning. In his opinion, real learning is closely related to what it means to be human. In an almost metaphysical way he believes that "Through learning we recreate ourselves. Through learning we become able to do something we were never able to do. Through learning we extend our capacity to create, to be part of the generative process of life."

Learning is generally understood as a word that describes a change in an individual's range and repertoire of behaviour. Psychologists usually define learning as a relatively permanent change in behaviour due to past experience (Coon, 1985). After having examined the several definitions of learning available, Arends (1994) observes that most psychologists perceive learning as a relatively permanent change in an individual's potential behaviour due to experience. A close examination of the above definitions would soon reveal that learning mainly involves three aspects, namely (i) some relatively permanent changes in the learner's behaviour, (ii) the change may be in the potential rather than necessarily in the actual performance, and (iii) the change must come about as a result of experience. The changes that occur in an individual owing to learning may be felt in the existing cognitive structure indicative of intellectual growth, development of newer life skills, methodological skills, attitude, interests, etc. Thus owing to learning, changes could be experienced not only in the individual's cognitive domain but also in their affective as well as in the psychomotor domains.

1.3.1 Learning as Acquisition of Knowledge

Knowledge relates to information and understanding one gains through education or experience. As learners focus their attention on what is heard or what is seen, details pertaining to it enters the mind through the various sensory organs. As the information enters the mind, prior knowledge pertaining to the matter already stored in the memory sites also is drawn and both the incoming new knowledge and prior knowledge get integrated and as a result knowledge is generated. This knowledge

that is constructed, depending upon the nature of processing involved, may go into six hierarchical levels, viz. knowledge, understanding, application, analysis, synthesis and evaluation. While learning one should not be satisfied with just the attainment of the lower level of knowledge such as knowing and understanding. Real inculcation of knowledge visualizes the attainment of higher levels of knowledge such as analysis, synthesis and evaluation.

1.3.2 Learning as Acquisition of Skills

As a result of learning, knowledge is not the only thing that is being attained. Along with knowledge, learners pick up both skills and attitudes. A skill is a learned activity that one develops through practice and reflection. To be skilled means to be able to perform a learned activity well at will. Each major skill may consist of a number of sub-skills. It is the totality of all these component skills that make up the overall skill.

Skills as an ability to perform something, includes proficiency, competence and expertise in the activity. Learning to drive a motor car, swinging a tennis racket or even tying a shoe lace, etc. are examples of skills. As practice of such skills continues, they become automatic and can be performed with little conscious thought. As the skill become automated the brain processes shift from reflective to reflexive.

1.3.3 Learning as Acquisition of Attitude

Apart from acquiring knowledge and skills, learning involves development of attitudes. Attitude is a mental state held by an individual which affects the way that person responds to events and organizes responses. Attitudes are commonly held to have three essential components, namely (i) a cognitive dimension involving beliefs and rationalizations that explain the holding of the attitude, (ii) an affective dimension involving the emotional aspects of attitude such as likes, dislikes, feelings of distaste, and (iii) a conative or behavioural dimension which involves the extent to which the individuals are prepared to act on the attitude that they hold.

1.4 DIFFERENT TYPES OF LEARNING

Depending upon the objectives for which people learn, they resort to different types of learning. The main types of learning are (i) Active and Passive Learning, (ii) Surface (rote) learning and Deep Learning, and (iii) Horizontal learning and Vertical learning. The learning types have been presented in their two extreme forms in the following section:

1.4.1 Active Learning and Passive Learning

Dewey (1933) described learning as an individual process, something that a person does, not something done to one. He continues to note that learning is not an affair of being told, but an active constructive process. Bruner's (1966) research confirmed that people who are actively involved in making sense of the world rather than passive receivers of information learn better. He explained that it is not, enough to merely gather information. The more the learners are involved in the process of learning, the greater is the retention. In active learning students use active methods like role playing, project, assignment, inquiry and discovery or other such activities for learning. They are at the centre of learning. As learners are actively involved, they understand better. This results in better learning. Conversely, when people learn through expository methods like lecture, demonstrations, etc. they have no role to play. They remain passive, as research shows, passive learning results only in low retention. In Self-Directed Learning, as learning is self-directed, it would yield greater retention.

1.4.2 Surface (rote) Learning and Deep Learning

In surface learning, the teeth of the learner do not sink deep into the subject matter. The learning is superficial. The main objective of rote learning is only to commit the matter to memory or learn it by heart. The main techniques used for this type of learning are repetition and drilling. When a learner tries to by-heart a poem for example, he or she is repeating the poem over and over again, till they are able to speak it out without any interruption. Similarly, when learners attempt to by heart multiplication tables, they also resort to simple repetition until, they are able to speak it out without support.

Unlike in rote learning, learners who are involved in deep learning, subject the content mater to deep processing. They are not simply satisfied with getting a superficial type of knowledge of the content they are learning. They not only strive and attain the lower order skills of perception and understanding but also cross over to the higher realms of higher order skills like analysis (critical thinking), synthesis (creative thinking) and evaluation (judgment). Only when learners cultivate the habit of deep learning, they will be able to make decisions, solve problems and accomplish tasks with ease and efficiency.

1.4.3 Horizontal Learning and Vertical Learning

Apart from active and passive learning and rote and deep learning, there is yet another type of learning known as Horizontal and Vertical learning. In vertical learning, the learner goes deeper into the subject matter and tries to get firm grip over the concepts being studied. The objective of such learning is to come into grip with the subject matter and have mastery over it. In horizontal learning, on the other hand, the objective is to cover the subject matter and other areas that are related to it. In other words, horizontal learning is concerned with covering larger areas of subject matter while vertical learning is concerned with going deeper into the concepts with a view to getting mastery over it.

As seen above, even though there are different types of learning, it is the objectives of learning that decides what type of learning is to be used in a learning situation. As a self-directed learner, it is the role of the learner to decide which type of learning is to be used, when and where.

1.5 THEORIES OF LEARNING

In the immediately preceding sections, attempts were made to define what learning is, and what different types of learning are there. In the section that comes below, different theories of learning are discussed. Learning as a process focuses on what happens when learning takes place. From the end of the 18th century to the present, several schools of thought existed and each school tried to study learning and bring out their own theories as to what learning is. A learning theory is an attempt to describe how people learn thereby helping people understand the inherently complex

process of learning. Multiple theories continue to evolve with each addition to the knowledge base in the field of learning. If this goes on at this rate, in the foreseeable future, there will undoubtedly be numerous competing theories on learning as well as numerous variants of those theories to cover specific types of individuals and learning situations. According to Hill (2002), learning theories mainly play two main roles. One of these roles is that they provide us with vocabularies and conceptual frameworks for interpreting the examples of learning that are observed. The other role that theories play is to give suggestions as to where to look for solutions to practical problems. The theories do not provide us with solutions, but they do direct our attention to those variables that are crucial in finding solutions.

Even though there are quite a number of theories as well as their variants, three of the most important theories are taken up and described here, namely, (i) Behaviourism, (ii) Cognitivism, and (iii) Constructivism. These three theories are taken up and discussed so as to illustrate the commonalities and differences existing among them.

1.5.1 Behaviourist Approach

Behaviourism as a theory of learning was primarily developed by B.F. Skinner. It loosely encompasses the work of scholars like Edward Thorndike, Tolman, Guthrie and Hull. What characterize these investigators are their underlying assumptions about the process of learning. All of them hold three basic assumptions related to learning. The first of these assumptions is that learning is manifested by a change in behaviour. Second, the environment shapes behaviour. And third, the principle of contiguity (how close in time two events must be for a bond to be formed) and reinforcement (any means of increasing the likelihood that an event will be repeated). These three basic assumptions are central to explaining the basic process of learning according to behaviourism.

This approach is thus concerned with changes in an individual's behaviour that occurs as a result to learning. Therefore, the behavioralist focuses primarily on the development of skills and abilities, as opposed to knowledge. For behaviorism, learning is the acquisition of new behaviour through conditioning, referred to as

classical and operant conditioning. Classical conditioning is a process whereby a subject is conditioned to respond to a certain stimulus from the environment. A well known example of this process is Pavlov's dog, which was trained to salivate when a bell was rung. This training was accomplished by repeatedly ringing a bell just prior to the dog's receiving food.

The theory of operant conditioning was developed by B.F. Skinner and the word 'operant' refers to the way in which behaviour 'operates on the environment'. Briefly, a behaviour may result either in reinforcement, which increases the likelihood of the behaviour recurring, or punishment, which decreases the likelihood of the behaviour recurring. It is important to note that, a punishment is not considered to be applicable if it does not result in the reduction of the behaviour, and so the terms punishment and reinforcement are determined as a result of actions. Within this framework, behaviorists are particularly interested in measurable changes in behaviour.

The behaviourists approach has been shown to work for relatively simple skills, but it is not effective when more complex tasks need to be learned. This approach is particularly ineffective when there is a strong cognitive component involved (such as decision making), or when temporal pairing is not feasible. According to temporal pairing, it is important that the time lag between the operant response and the feedback be relatively short, so that the individual will correctly pair the behaviour with the feedback.

1.5.2 Cognitivist Approach

The earliest challenge to the behaviourists came in a publication in 1929 by Bode, a gestalt psychologist. He criticized behaviourists for being too dependent on overt behaviour to explain learning. Gestalt psychologists proposed looking at the patterns rather than isolated events. Gestalt views of learning have been incorporated into what have come to be labeled cognitive theories. Two key assumptions underlie this cognitive approach: (1) that the memory system is an active organized processor of information and (2) that the prior knowledge plays an important role in learning.

Cognitive theories look beyond behaviour to explain brain based learning. They are concerned with the changes in an individual's knowledge that result from experience with a stimulus environment. The cognitive approach is based upon the concept of schemata, or mental models, by which individuals organize their perceived environment. During learning, these schematic structures change by the processes of specialization and generalization. Specialization involves the integration of new information and experiences into existing schemata. Generalization is the process of modifying existing schemata or of creating new ones. For these processes to work in a training environment, it is necessary to provide multiple opportunities for the individual to make changes and additions to existing models based on experience with the environment.

Mental models exist in long- term memory. Therefore, to make training effective, learning must transfer from short-term memory to long-term memory. Different theories have arisen as to the means by which this transfer occurs. What is important to realize is that an effective learning environment must facilitate this transfer. An individual's mere recollection of a training event, even in minute detail, does not by itself assure that learning has taken place, because this recollection may involve only short-term memory. A training program must incorporate multiple exposures and the right kinds of exposures to the environment and provide feedback from it, in order for this transfer to take place.

According to the cognitive approach, in order to ensure that changes in knowledge occur, the learning must be "meaningful". That is, there must be perceived consequences for integrating new knowledge or for failing to do so. Cognitivists consider how human memory works to promote learning. For example, the physiological processes of sorting and encoding information and events into short-term memory and long term memory are important to educators working under the cognitive theory.

Once memory theories like the Atkinson-Shriffin memory model and Baddeley's working memory model were established as a theoretical framework in cognitive psychology, new cognitive frameworks of learning began to emerge during the

1970s, 80s and 90s. Today, researchers are concentrating on topics like cognitive load and information processing theory. These theories of learning play a role in influencing instructional design. Aspects of cognitivism can be found in learning how to learn, social role acquisition, intelligence, learning and memory as related to age.

Educators employing a cognitivists approach to learning would view learning as internal mental process (including insight, information processing, memory, perception) where in order to develop learner capacity and skills to improve learning, the educator structures content of learning activities to focus on building intelligence and cognitive and meta cognitive skills.

1.5.3 Constructivists Approach

The learning theories of Jean Piaget, Jerome Bruner, Lev Vygotsky and John Dewey serve as the foundation of constructivist learning theory. Constructivism views learning as a process in which the learner actively constructs or builds new ideas or concepts based upon current and past knowledge or experience. Thus constructivism is based on the belief that learning is a self-assembly process. In other words, "learning involves constructing one's own knowledge from one's own experience." Constructivists suggest that individuals "construct" their understanding of a topic area through two processes: conflict resolution and reflection. Constructivist learning, therefore, is a very personal endeavor, whereby internalized concepts, rules, and general principles may consequently be applied in a practical real world context. Constructivism itself has many variations, such as Active learning, discovery learning, and knowledge building. Regardless of the variety, constructivism promotes a student's free exploration within a given framework or structure. The teacher acts as a facilitator who encourages students to discover principles for themselves and to construct knowledge by working to solve realistic problems. Aspects of constructivism can be found in self-directed learning, transformational learning, experiential learning, situated cognition and reflective practice and religious practice.

The characteristics of constructivism are as follows:

- Students construct their own knowledge of the world.
- Learning is a search for meaning, looking for wholes as well as parts.
- To teach well we have to understand what students are thinking
- Standardised curricula are antithetical to constructivism
- Learning is self-directed and active.
- Learning derives from experiences.
- Knowledge is constructed internally by the learner rather than transmitted from an external source.
- Learning takes time.
- Learning involves language
- Learning involves higher order thinking.
- Learners continuously organize, reorganize, structure and restructure new experiences to fit them to existing schemata, knowledge and conceptual structures through an adaptation process of assimilation and accommodation to accord with new views of reality, in striving for homeostasis (equilibrium) – the balance between assimilation and accommodation.
- Knowledge is uncertain, evolutionary, pragmatic and tentative.
- Knowledge and understanding are constructed by the learner rather than imparted by the teacher.
- Knowledge is socially and culturally mediated and located.
- Learning is an individual and a social activity.
- Learning is self-regulated.
- Intelligent thought involves metacognition.
- Learning is, in part, an organizational process to make sense of the world.
- What someone knows is not passively received but actively assembled by the learner.

- Knowledge is accommodated to learners' personal existing understanding, changing their frames of reference through adaptation.
- Learning is marked by the learners' capacities to explore and experiment.
- Knowledge is revisionary and multisensory.
- People generate their own mental models to make sense of their experience.
- Motivation is critical to effective learning.
- Knowledge is creative, individual and personal.
- Learning is marked by the learner's capacities to explore and experiment.

In the above section, different theories of learning such as behaviourism, cognitivism and constructivism are discussed. As it could be seen, one could see how the concept of learning has undergone substantial change. In the first half of the 20^{th} century when the behaviourist thoughts were dominant, learning was considered to be a response strengthening process. However, during the next two decades the cognitivist school of thought prevailed. The cognitivists considered learning as acquisition of knowledge and skills. Thereafter, the constructivist school of thought came to be favoured. The constructivist believed that knowledge is not passively caught but rather, it is actively constructed. Thus it is seen that over the last century, the concept of learning has been undergoing substantial changes. At present, it is generally believed that learning is self-directed and active. It derives from experience. Knowledge is constructed internally by the learners rather than transmitted from an external source. As learners construct, they continually organize, reorganize, structure, and restructure to fit them into existing schema. While preparing the strategy the investigator has taken into consideration several aspects of cognitivists theory of learning and constructivism. Among them information processing theory which belongs to the cognitivist theory of learning is important and thus has been discussed in detail in a later section of the chapter. Further the strategy is an attempt to enable the learners to construct knowledge on their own. Thus the present trend of pedagogy as proposed by NCERT, which lays emphasis on the theory of constructivism is also reflected through the strategy.

Further, if learning is to be effective, learners ought to know the various components that lead to effective learning.

1.6 COMPONENTS OF EFFECTIVE LEARNING

In the previous sections, discussion has already been made about the historical perspective of learning, the different types of learning, and the theories of learning. In what follows attempt is made to explain the different components of effective learning. If the learners are to learn effectively, they have to fulfill certain prerequisites. They need to develop sufficient level of world knowledge, knowledge of cognitive strategies and knowledge of metacognitive strategies. Only when all these prerequisites are met at sufficient level, individuals can turn out to be effective learners. According to Garry D. Borich (1996), effective learning has three major components namely (i) world knowledge (ii) knowledge of cognitive strategies, and (iii) knowledge of meta-cognitive strategies. As these components play crucial role in effective learning, they need to be discussed at length.

1.6.1 World Knowledge

Infants at the time of birth, as Piaget (1972) notes, are born with a few practical instincts such as sucking, looking, grasping, reaching etc which Piaget called as schemas – a unit of cognitive structure in the shape of a general ability. These schemas with their content form the basic structure of the human mind (Myers, 1986). As infants grow, they begin to interact with their immediate social and physical environment. In the process, their cognitive structure begins to develop through the processes of assimilation and accommodation. If the action they are presently involved are similar to their earlier actions, they get assimilated into their cognitive structure. However, if the action involves something novel, they accommodate it into their cognitive structure. Thus as infants grow into childhood and adolescence, they increase their knowledge and skills. The total of all that is stored in their long term storage form the basis for their view of the world around them. It helps them to make sense out of the various events, to understand the laws of nature, to recognize cause and effect and to form decisions about goodness, truth, and beauty. This total construct of how they see the world as Sousa (2006) observed is called the cognitive belief system.

Deep within the cognitive system of the people lies their self-concept. Their cognitive belief system portrays the way they see the world. Their self-concept be it positive or negative, describes the way they see themselves. Their self-concept is shaped by their past experiences. Some of their experiences like passing a difficult test, or getting recognition for doing a job well can raise their self-concept while experiences like receiving reprimand or failure to accomplish a task would lower their self-concept. The additions of new positive or negative experiences moderate their self-concept and alter the way they see the world around them. It is their experience that determines their confidence level, and willingness to take risks, etc.

In short, as Antony Robbins (1991) observes, it is experiences that provide the building blocks for the people's beliefs, rules and values. Experiences are all what people have recorded within their nervous system. Everything that they have seen, heard, touched, tasted, etc are stored in their long term memory sites. People's past experiences have a lot to offer in their attempt at learning. If they believe that they are good at learning, they should have sufficient number of instances to support that belief. Limited experiences create limited life. If people want to expand their lives, they need to extend their knowledge and skills by pursuing ideas and experiences. Learning is 'marked by the learners' capacity to explore and experiment. The more their experiences, the greater is the possibility for the expansion of their knowledge and skills. The deeper their knowledge, the greater is their possibility of their being intuitive and wise. Intuition as Robbins (2003) notes is an unconscious process created out of distilled experiences. It is again experiences that equip people with wisdom and common sense. It is their wisdom, observes Covey (1992), that make people avoid past mistakes, increase their self-worth, boost their self-confidences and help them make decisions and solve problems.

As already noted, wisdom, intuition and common sense, etc are all creations out of distilled experiences. People who are wise can see through things easily, make decisions and solve problems as compared with people who are ignorant. It is now generally believed that knowledge and skills are constructed internally by the learners rather than transmitted from an external source. Learning is marked by the

learner's capacity to explore and experiment. They continually organize, reorganize, structure and restructure new concepts and skills. Construction of new concepts and skills involves integration of already stored information in the long term memory sites and incoming new information. In the absence of prior knowledge, construction of new knowledge and skills become difficult. A child, for example, who is not having sufficient world knowledge, may not be able to differentiate between a 'boat" and a 'ship', nor can he see a 'hill' different from a 'mountain'.

In short, as it is understood, the presence or absence of knowledge of the world makes a lot of difference in learning. So individuals who aspire to be efficient learners need to build up a sound knowledge base pertaining to the world in general.

1.6.2 Knowledge of Cognitive Strategies

Having a sound knowledge base of the world alone may not make people effective learners. Apart from that, they should have sound knowledge about cognitive strategies. Cognitive strategies, as Woolfolk (2006) defines, are ideas for accomplishing learning goals-a kind of overall plan of attack. They are general methods of thinking that improve learning across a variety of situations. Years of research indicates that using good learning strategies help learners' in their learning. A strategy is an art of handling any task to the best advantage. It refers to a series of well planned actions for achieving an aim. Important, although they are, they are seldom taught directly at schools. Self -managed learners need to know about them if they are to learn effectively.

Sousa (2006), West et al. (1991) and quite a number of other scholars have identified and highlighted a number of cognitive strategies. These strategies play crucial role in self-managed learning. Some of the most important among them are chunking, bridging, rehearsal, practice, organization, reading comprehension and mnemonics strategies.

(i) **Chunking Strategies** : These are certain limits to people's working memory to handle things at one time. If related items are presented as a few larger blocks of information rather than many small fragments so that the working memory would perceive it as a single item. For example, the sentence

"Mohan went home with his friends in the evening", can be read in three blocks in three fixations of the eyes by increasing the eye span even through peripheral vision. This way of reading in blocks (phrasal reading) not only saves time but also increases comprehension.

(ii) **Bridging :** This is a strategy in which the learners take up one situation with which they are familiar and use an analogy to examine the similarities and differences between one system and the other. A learner in his /her attempt at learning the functioning of the human ear may take up the analogy of the telephone. They may apply their knowledge of the functioning of the human ear by transferring it in the case of the telephone. They will then examine the similarities and differences between the two systems by way of transfer. Another typical example can be "Camel is the ship of the desert". Here the comparison and contrast are between the ship that traverses the vast ocean and the camel. This strategy generally makes use of situation involving analogy and metaphor.

(iii) **Rehearsal Strategies :** Rehearsal refers to the learners' reprocessing of new information with a view to getting the sense and meaning. Depending upon the objective, rehearsal can be role (shallow) or elaborate. Rote rehearsal is resorted to when the purpose of rehearsal is remembering things as exactly presented. Examples of role rehearsal are repetition of spelling of words, lines of a poem, multiplication tables, etc. On the other hand, if the purpose of rehearsal is to find deeper understanding, one has to apply elaborate rehearsal of information through paraphrasing, questioning, summarizing etc. The use of elaborate rehearsal strategies would lead to greater retention of information in the memory sites of the long term memory.

(iv) **Practice Strategies :** Practice makes things permanent. It involves the use of newly learned skills in novel situation with sufficient accuracy so as to remember it correctly. What is learned should be practiced frequently at first to gain initial competence. This type of practice is called massed practice.

Once the initial competence is achieved, they continue to practice at longer periods of intervals. This type of practice is known as distributed practice.

(v) **Mnemonics :** Mnemonics are strategies that learners use to remember unrelated information, patterns, or rules. They are systematic procedures for improving memory. Examples of mnemonics are acronyms, rhyme mnemonics, abbreviations, etc.

(vi) **Organization Strategies :** These strategies involve schematic systems to establish relationship among the various parts or elements. Examples of these are graphic organization such as webs, mind maps, concept maps, analogy maps, etc.

(vii) **Reading Comprehension Strategies :** The main purpose of reading is to get the message out of the text. There are a host of strategies that learners can use to derive meaning from what is being read. Specific examples for these are SQ3R, SQ4R, KWL, etc.

The strategies mentioned above are some of the specific strategies that help learners to be cognitively engaged in the learning task. They help the learners to focus their attention on relevant aspects of the material being learned, to invest their effort, to make connections, elaborate, translate, organize and reorganize, to think and process information deeply. The more the learners are conversant with these learning strategies, the more effective and efficient would be their effort at learning.

1.6.3 Knowledge of Meta-cognitive Strategies

Learners should have not only world knowledge and knowledge about various cognitive strategies but also knowledge about meta cognitive strategies if they are to learn effectively. Meta cognition involves knowledge and beliefs about the learners own cognitive processes. Meta-cognition, as Santrock (2006) defines, is cognition about cognition or knowing about knowing. According to Ashman and Conway (1989) meta-cognition is an individual's capacity to monitor and regulate their own mental processes while approaching a new learning task or solving a problem. In other words meta-cognition refers to awareness about the learning content, the

ongoing performance of the learning process and the cognitive control measures to monitor, regulate and evaluate one's own cognitive processes. Meta-cognition includes self-interrogation, self-checking, self-monitoring, self-analysis and using memory aids.

Meta-cognition involves a number of strategies and tactics. These strategies and techniques are generally used when cognition fails. They help the learners in accomplishing the objectives of learning. Some of the skills that meta-cognition offers the learners are as under:

(i) Planning the way to approach a learning task.

(ii) Evaluating the progress towards the completion of a task.

(iii) Maintaining motivation to see the task to completion.

(iv) Ability to become aware of distracting stimuli both internal and external and sustain effort over time.

(v) Monitoring progress of learning.

(vi) Correcting errors.

(vii) Analyzing effectiveness of learning.

(viii) Changing learning behaviour when necessary.

Apart from these skills, meta-cognition has in its repertoire, a number of strategies to help the learners in case their attempt at learning fails. Some of these strategies are as given below:

(i) Self questioning: This strategy enables the learner to pose certain questions such as what do I know about the topic? How have I solved problems like this earlier.

(ii) Reflecting over experience once it is over.

(iii) Making graphic maps or representations concept maps, flow charts, mind maps, semantic webs.

(iv) Connecting new knowledge to former knowledge.

(v) Selecting thinking strategies deliberately.

(vi) Planning, monitoring and evaluating thinking processes.

(vii) Consciously identifying what they already know.

(viii) Estimating time required to complete a task.

(ix) Planning study time into their schedule and setting priorities.

(x) Organizing material.

(xi) Taking necessary steps to learn by using strategies like outlining, mnemonics and diagram.

As learners examine the various skills and strategies that fall under both cognition and meta-cognition, they may find some of them overlapping. However, one need not be confused about them. If it is concerned with accomplishment of the learning goal, it belongs to the cognitive strategy. Conversely if it is concerned with overcoming a cognitive flow, it is meta-cognitive.

As self-managed learners, people need to examine and find whether they lack in any of these components. In case they find missing proficiency in any of these areas, they have to make concerted effort to build up competence in all these components. Only when they have adequate level of proficiency in all these areas, they can be effective learners.

1.7 THE PROCESS OF LEARNING

The next question that comes to mind is how learning takes place i.e. How does knowledge, cognitive strategies and meta cognitive strategies get into our head in the first place, and once this content gets there, what happens to it? How does it get organized and sorted? Where exactly is the information stored? How is it retrieved? All these questions have to do with how the mind works or how the brain deals with information. The answers to these questions would greatly help us in our efforts to teach learners to learn better.

The primary source of information concerning human learning comes from research related to information processing and cognitive controls according to which learning

is a monitored, controlled, and directed cognitive activity, utilizing the information processing system of the brain for the purpose of modifying cognitive structures. Thus learning is not automatic rather it requires a sustained and conscious effort on the part of the individual. In order for this effort to occur the individual must understand the learning processes and how to control and direct it.

In the following sections, information regarding what cognitive psychologists know about how the mind takes in information and what it does with that information once it gets there, have been explained with the help of information processing model.

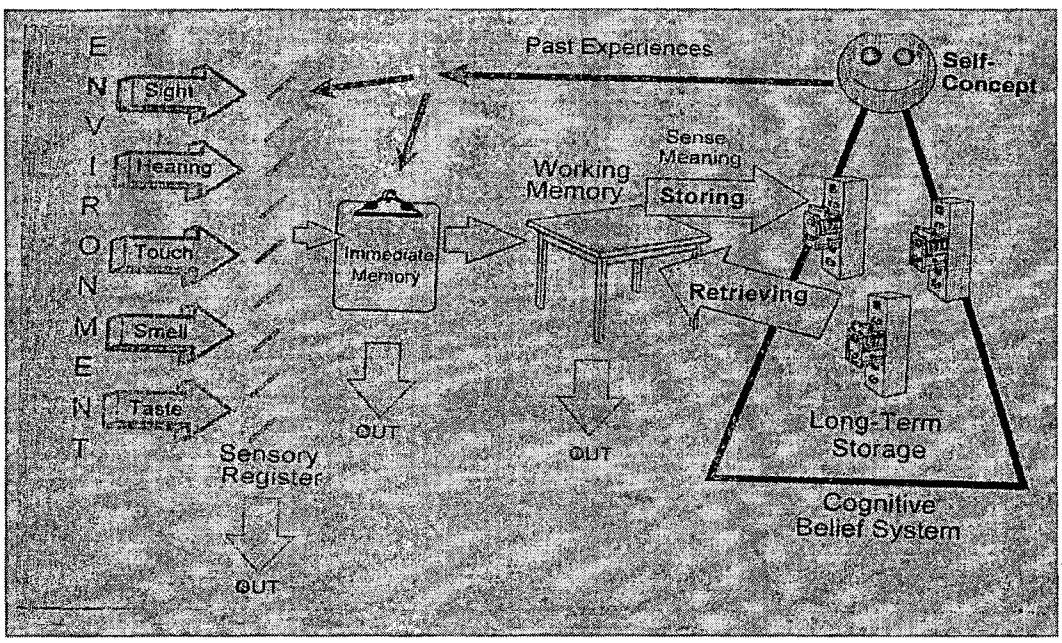
1.7.1 The Information Processing Theory

The primary source of information concerning human learning comes from research related to information processing and cognitive controls according to which learning is a monitored, controlled, and directed cognitive activity, utilizing the information processing system of the brain for the purpose of modifying cognitive structures. Thus, learning is not automatic. Rather it requires a sustained and conscious effort on the part of the individual. In order for this effort to occur the individual must understand the learning process and how to control and direct it.

The rapid proliferation of computers has encouraged the use of the computer model to explain brain functions and learning. Several models exist to explain learning and brain behaviour. Research in cognitive psychology has shown how the brain processes and learns information. As a result of these studies scholars have come out with a model of learning known as the information processing model. The precursors of this model were Atkinson and Shriffin (1968), Stahl (1985). The model discussed here (Fig. 1.1) has been updated and it incorporates much of the recent findings of complex research of neuroscientists. This model which has been put forward by David. A. Sousa (2006) uses common objects to represent various stages in the learning process. The model limits its scope to the major cerebral operations that deal with the collecting, evaluating, storing and retrieving of information. The model starts with information from our environment and shows how the senses reject or accept it for further processing. It then explains the two temporary memories, how they operate, and the factors that determine if a learning

is likely to be stored. The model is simple, but the processes are extra ordinarily complex.

Figure 1.1 : The Information Processing Model



Source: How the brain learns – D.A. Sousa

The Senses

The information which comes from the environment is detected by our five senses viz. sight, hearing, smell, touch and taste. All sensory stimuli enter the brain as a stream of electrical impulses that result from neurons firing in sequence along the specific sensory pathways. The senses do not all contribute equally to our learning. Over the course of our lives, sight, hearing, and touch (including kinesthetic experiences) contribute the most. Our senses constantly collect tens of thousands of bits of information from the environment every second, even while we sleep (Sousa, 2006).

Sensory Register

All incoming sensory information (except smell) is sent first to the thalamus, which briefly monitors the strength and nature of the sensory impulses for survival content and in just milli seconds, uses the individuals past experiences to determine the data's degree of importance. Most of the data signals are unimportant, so the sensory

register allows them to drop out of the processing system. The sensory register does hold sensory information for a very brief period of time (seconds). This is referred to as sensory memory.

Short-Term Memory

Short-term memory is used by cognitive neuroscientists to include all of the early steps of temporary memory that will lead to stable long-term memory. Short- term memory primarily includes immediate memory and working memory. (Gazzaniga, et al., 2002; Squire and Kandel, 1999)

Immediate Memory

Immediate memory has been represented as a clipboard, in the model, a place where we put information briefly until we make a decision on how to dispose of it. Immediate memory operates subconsciously or consciously and holds data for up to about 30 seconds. The individuals experience determines its importance. If the item is of little or no importance within the time frame, it drops out of the system.

Working Memory

Working memory is also a temporary memory and the place where conscious, rather than subconscious, processing occurs. The information processing model represents working memory as a work table of limited capacity where we can build, take apart, or rework ideas for eventual storage somewhere else. When something is in working memory, it generally captures our focus and demands our attention. Information in working memory can come from the sensory/immediate memories or be retrieved from long-term memory. Miller (1956) discovered years ago that working memory can handle only a few items at once. This functional capacity changes with age. Nonetheless, most of the research evidence to date supports the notion that working memory has a functional limit, and the number seven continues to be accepted as a workable guideline for adolescents and adults. Working memory is temporary and can deal with items for only a limited time. According to Peter Russell (1979), it is 5 to 10 minutes for pre adolescents and for adolescents and adults it is 10 to 20 minutes. This means an adolescent (or adult) normally can process an item in working memory intently for 10 to 20 minutes before mental fatigue or boredom

with that item occurs and the individual's focus drifts. For focus to continue there must be some change in the way the individual is dealing with the item. If something else is not done with the item, it is likely to fade from working memory. Information in working memory is quickly forgotten unless the learner attempts to prolong its stay. This can be done by using memory strategies. Several theories try to explain why working memory is of such limited duration and capacity. Decay theory holds that information simply dissipates with the passage of time unless we rehearse the new information. While decay theory presents some vivid metaphors, it is not as convincing as displacement theory. Displacement theory (Miller, 1956) suggests that there are only so many "slots" in working memory that can be filled. Once new information comes into working memory, the existing information is pushed out and replaced by the incoming data. Displacement theory is closely related to interference theory (Ausubel, 1968), which posits that subsequent learning competes with prior learning and somehow interferes with what is contained in working memory. Information in working memory is like the information in working memory of the computer. To save it, it must be transferred to a long-term storage device. Working memory helps process information into a form that is acceptable for more permanent storage in long-term memory – like saving a document on the hard drive in a computer.

Long-Term Memory

The long-term storage areas are represented in the model (fig.) as file cabinets – places where information is kept in some type of order. Although there are three file cabinets in the diagram for simplicity, we do not know how many long-term storage sites actually are present in the brain. Memories are not stored as a whole in one place. Different parts of a memory are stored in various sites which reassemble when the memory is recalled. Long-term memory is a dynamic, interactive system that activates storage areas distributed across the brain to retrieve and reconstruct memories. Information from working memory may be stored in long-term memory. Storage is a term or metaphor that describes a series of processes whereby new information is integrated with information that is already known or residing in long term memory. The principal storage processes, as already discussed, involves rehearsal, elaboration and organization.

There is considerable discussion among cognitive psychologists about what exactly is stored in long-term memory. At one level, we know that declarative and procedural knowledge are stored there. But what form does this information take in long-term memory? Cognitive psychologists propose a number of theories about how knowledge is represented in Long term memory: dual coding theory, propositional networks, and schemas. In thinking about how we think, we all depend on images to help us. We also depend on words, particularly when we can't construct an image. Paivio (1971, 1986) has developed a dual-coding theory of long term storage. He believes that information in long term memory is composed of complex networks of verbal representations and images. In addition to verbal images, however, we also think in terms of connected ideas. Anderson (1983) proposes that much declarative knowledge is stored in long term memory in the form of extensive networks of interconnected ideas called positional networks. Cognitive psychologists propose that if we could see into a learner's brain and examine those neurons that contain information about a particular concept, it would look something like a web of ideas, concepts and facts.

A third hypothesis about the form of information in long term memory is called schema theory (Anderson & Pearson, 1984). Cognitive schemata are integrated units of knowledge. They are cognitive structures that organize large amounts of information about objects, events or text readings. These schemata influence how learners perceive and make sense of what they hear and read.

Capacity of Long-term Memory

Most cognitive psychologists stipulate that information in Long-term memory lasts a lifetime. (Gagne, Yekorich & Yekorich, 1993). Cognitive psychologists believe that our experience of forgetting things we once knew is due more to our failure to find a good way to retrieve the information than to any permanent loss of data.

Retrieval Processes

When we actively search our memories for information to use in a thinking task (to get it into working memory) we are engaged in retrieval processes. Cognitive psychologists use the term activation to refer to cognitive processes involved in

becoming aware of what we have learned and in establishing connections between this prior learning and the task in which we are currently involved. This connection building is facilitated by the use of retrieval cues. Retrieval cues are hints or things we say to ourselves to help us remember what we have already learned and stored in Long term memory. Retrieval cues are particularly effective when the cue you are using to recall information matches information that you stored at the time of original learning. Tulving (1989) believes that good recall of memorized information is largely cue-dependent. We forget the meaning of a word that we once knew, because we don't have a cue that emphasized remembering it. Depending on the type of recall we want, there are many cues (meaning, spelling, date, name, address, phone numbers, etc.) to match it.

1.7.2 Implications for Learning

The information processing model of how the mind works is a metaphor. This model helps us in thinking about how the minds of a learner works, thus enabling us to present content in such a form to help learners understand better and retain whatever they learn. The information processing model helps us understand how information gets into the mind, how it is stored, and how it is retrieved for use in thinking. Following are some implications of the information processing model of learning.

(i) One cannot recall information that one's brain does not retain.

(ii) How a person "feels" about a learning situation determines the amount of attention devoted to it.

(iii) The working memory can handle only a few items at once. This functional capacity changes with age. Pre-school infants can deal with about two items of information at once. Pre-adolescents can handle 3 to 7 items, with an average of five. Adolescents and adults can handle five to nine items of information, with an average of seven. Thus keeping the number of items in a learning block within the appropriate capacity limit increases the likelihood that more learning will be retained.

(iv) It is possible to increase the number of functional capacity of working memory through a process called chunking.

(v) Since the working memory is temporary and can deal with items for only a limited time (15-20 minutes) it is important to package a study block into 15 to 20 minute session which is likely to result in maintaining greater learner interest than one 40 minute study block.

(vi) Information is most likely to get stored if it makes sense and has meaning. Past experience always influence new learning. Therefore, we need to be certain that whatever we learn contains connections to our past experience.

1.8 THE SELF-MANAGED LEARNING STRATEGY

A strategy may be defined as a planned approach to any task. In other words, a strategy is an art of handling any task to the best advantage. It refers to a series of well planned actions for achieving an aim. The self-managed learning strategy is an attempt by the investigator in developing learning-to-learn skills among learners in general and student-teachers in particular. Learning to learn skills or the self-managed learning skills are skills that a learner might find quite useful while going about a learning task. It will not only enhance his learning but will make the learning process an enjoyable one.

1.8.1 Assumptions of the Present Study

From the study of literature related to learning and from the researcher's own experience there are three basic assumptions based on which the present strategy has been developed. The three assumptions on which the self-managed learning strategy is based are as follows:

(i) Self-managed learning skills exist to some extent among all learners.

(ii) The Self-managed learning skills are not sufficient or have not been properly developed among learners to overcome the challenges they face.

(iii) Self-managed learning skills can be enhanced so that the process of learning becomes more efficient and enjoyable.

1.8.2 The Modules

The self-managed learning strategy has been prepared by the investigator by taking into consideration the different theories of learning, the components of effective learning and the theory of how people learn or the information processing theory. The investigator prepared the strategy in the form of self-instructional modules. Modules or self- instructional materials are based on the principles of learning in general and self-learning in particular. Textual material in the modular form is self-contained, sequentially arranged and consists of activity packages. The text is presented in a simple language with cues to facilitate self-learning. It also includes in text exercises to promote motivation to learn, which is also helpful in making learning interactive. A module provides opportunities for self-assessment and continuous feedback. Modules or self-instructional materials have been defined in many ways. They enable learners to learn independently, unaided and at their own pace. It has its own structure. It is theme based and self-contained. It includes objectives, learning exercises, in text assessment for offering continuous feedback. There is a built-in flexibility in the text which promotes interaction. Therefore, self-instructional material or modules consists of self-contained learning activity packages which promote self-learning, self-evaluation and self-enhancement through continuous feedback. It thus effectively helps in achieving the predetermined objectives. In the present study, the investigator prepared the self-managed learning strategy in the form of six modules in order to achieve the aim of developing learning to learn skills or self-managed learning skills among student-teachers. The six modules of the strategy pertain to the six different skills which has been identified and included in the present study by the investigator. The self-managed learning skills which have been included in the present study are as follows:

(1) Goal setting skill

(2) Information location skill

(3) Information processing skill

(4) Information storing skill

(5) Information retention skill

(6) Information retrieval skill

1.8.2.1 Goal setting skill

The first skill which has been taken up in the self-managed learning strategy is goal setting skill. Goal setting is a powerful process to know precisely what one wants to achieve and where exactly to concentrate one's efforts. It is a natural function of the brain. By setting a goal we make a decision which in turn triggers a subconscious process in our mind that transforms the decision into a deed. For successfully managing ones own learning it is essential to identify academic goals. Researches have shown that students who set effective goals achieve at higher levels than other students (Bandura, 1986; Locke & Lantham, 1990). Therefore, learning the most effective way to set goals is the number one prerequisite for success in any endeavor for any individual, team or organization. Properly set goals can be incredibly motivating, and as one gets in the habit of setting and achieving goals, ones self-confidence builds (Manktelow, 2007). Learning to set and achieve goals is the master skill of life as it is the skill that enables the achievement and learning of all other skills and objectives.

1.8.2.2 Information location skill

The second skill which has been taken up in the strategy is the information location skill. Being able to search for useful information that is relevant to one's studies is one of the key skills that will improve performance, as well as the overall quality of the study experience. The information and skills one requires to achieve the set goals may be found scattered in various sources. They may be found in internet, library, and periodicals and even in knowledgeable people. Learners need to locate the sources of information and skills they need with respect to their goals and objectives. In order to gather information from these sources they need to develop skills of (a) reading – for locating information from written text material, (b) browsing – to locate information from the internet (c) interviewing – to get information from knowledgeable people, etc. Further, since this is the information age, a large amount of information is available through various sources including the

internet. Therefore, it is important to learn to evaluate these resources and learn about copyright laws and how to avoid intellectual dishonesty.

1.8.2.3 Information processing skill

The third skill of the strategy pertains to information processing. Simply absorbing the knowledge by seeing and hearing it and recording it will only enable us to retain it and play it back like a tape recorder. If one behaves like a tape recorder, the new information will not get integrated with ones prior knowledge and understanding, and thus cannot be used effectively in new tasks and be transferred readily to new situations. Moreover, the information given in original sources may be much more elaborate than what we require. It may be presented in a jumbled manner. Also the information given in the author's language has to be converted into our own language. Thus it is essential to develop expertise in processing information. There are three main processes involved in data processing. The first process involves focusing attention in the short-term memory on relevant pieces of information received and sifting out relevant from irrelevant information. This involves selecting information from the sensory input (e.g. reading, hearing) and adding that information to the short-term memory (Meyer, 1984; Sternberg, 1985). The second process involves organizing, or building connections among, the selected pieces of information into a coherent whole within the short-term memory (Meyer, 1984; Sternberg, 1985). The third process involves integrating, or building external connections between, the organised new knowledge and organised existing knowledge in the long-term memory (Meyer, 1984; Sternberg, 1985).

1.8.2.4 Information storing skill

The fourth skill which has been taken up in the strategy is information storing skill. Once the information is gathered and organized, it has to be stored by keeping futuristic needs in mind. Information storing mainly involves two skills viz. notes taking and notes making. **Note taking** implies taking notes during a lecture sometimes copying down what is written on the blackboard or dictated. One may also take notes from books, copying chunks of important matter or summarizing. These notes are usually unorganized.

Note making implies organizing rough notes, by combining notes taken during lectures with those taken during study from various reference books. All related ideas are put together in a particular order, and in an easy to read format. Information storing may also be carried out in terms of pictographic techniques such as mind mapping, flow charts, graphs, etc. This type of storing of information has several advantages over verbal storing of information. It helps the learner to have a holistic view of the entire topic at a single glance.

1.8.2.5 Information retention skill

The fifth skill which has been included in the strategy is information retention skill. Learning and retention are different. Learning involves the brain, the nervous system, and the environment, and the process by which their interplay acquires information and skills. Sometimes, we need information for just a short period of time, like the telephone number for a pizza delivery, and then the information decays in just a few seconds. Thus, learning does not always involve long-term retention. Retention refers to the process whereby long-term memory preserves a learning in such a way that it can be located, identified, and retrieved accurately for future use. In other words, retention or memory as Sousa, 2006 notes, is the process by which we retain the knowledge and skills for the future. It is the process of holding information in the memory. Retaining knowledge over the long term requires that we process it in such a way that we move ideas from short-term memory to long term memory and fit these new ideas in with what we already know.

1.8.2.6 Information retrieval skill

The sixth and the last skill taken up in the strategy is information retrieval skill. Simply retaining information is not enough. We need to retrieve it when required. Retrieval skills come into picture when we need to give exams, give talks, participate in seminars or debate, solve problems, etc. Without gaining retrieval skills, what ever has been learnt has no value. The brain uses two methods to retrieve information from the long-term storage sites; recognition and recall (Sousa, 2006). Recognition matches an outside stimulus with stored information. Recall is quite different and more difficult. It describes the process whereby cues and hints

are sent to long-term memory, which must search and retrieve information from the long-term storage sites, then consolidate and decode it back into working memory.

1.8.3 The Hypothesis of the Study

It was hoped, when a strategy framed out of the components mentioned in the above paragraphs is administered on a group of student-teachers, it would be quite effective. Therefore, a directional hypothesis stating that there would be an improvement in the self- managed learning skills of student-teachers was proposed for the present study. This was because the components of the strategy were identified and selected in accordance with the characteristics of the pupils, objectives to be achieved, and is completely based on the scientific researches based on learning. Moreover, the various components, of the self-instructional strategy, were incorporated and integrated in such a way as to contribute to each other. For example, the components of each module first impart an overall view regarding the objectives to be covered in that particular module followed by introduction to the various concepts covered in the module. This is followed by stepwise explanation of each concept covered in that particular module. After each concept, enough activities and exercises are provided in order to provide opportunity for putting those concepts into application. The summing up at the end of each module helped them revise the concepts already learnt. Further the section on reflections provided at the end of each module helped the student-teachers to integrate the concepts learned, while the key to the activities and 'Test yourself' helped them to compare their answer with those given and arrive at the correct answer. Thus the various components of the strategy assist one another in achieving the instructional objectives. It was therefore hoped that the strategy would be an effective one to bring out the expected learning behaviour in the student-teachers.

1.9 RATIONALE OF THE STUDY

Education has always been important, but perhaps never more so in man's history than today. Life long learning and development has become an indispensable part of today's living. This change is a result of explosion of knowledge which has brought about drastic changes in all spheres of human life. The people of today have to

process more information, cope with social developments and critical situations and make more decisions. Thus, twenty-first century requires the development of highly sophisticated skills so that people are able to follow the social & economic changes and influence them.

Moreover, in the present world scenario where it is predicted that knowledge is getting doubled at a very fast rate, it is important that students develop the ability to handle the vast amount of information coming from various sources. It is not possible for any individual to pick up all these knowledge, nor is it humanly possible to do so. In that case, one has to be selective and be able to process the information which he/she requires. Unfortunately, the education process carried out in our schools and colleges invariably lag behind the advances in information and communication technology. Due to this, the vast majority of products, come out of these institutions, perhaps with a little more of book learning and of course a degree, but with very little capacity for self-study. As a result, after coming out of these institutions, the students find themselves handicapped because the knowledge that they gained in these institutions become outdated by the time they enter a job and start living an active social life. Thus, it is increasingly being recognized that children need to "learn how to learn", so that they can continue learning throughout their life. This view has been highlighted by UNESCO in its report on education according to which education should help students acquire the instruments of knowledge: the essential learning tools of communication and oral expression, literacy, numeracy and problem-solving; to gain both a broad general knowledge and an in-depth knowledge of a few areas: to understand rights and responsibilities; and most importantly, to learn how to learn." Since education is a man-made process, designed to serve our changing needs, it is in need of creative invention to make it work better. More than ever before it has become important to equip the students of present system with the skill of learning to learn. Although the students of today have vast amount of readily available information, they have not enough knowledge about how to process this information and retain and retrieve it as and when required. In an age where everything is constantly changing, constantly evolving, the one technology, the one ability that would never turn obsolete is to

learn how to learn. This one ability will make a person able enough to cope with the changing demands of the society and thus contribute effectively towards its development. Thus, it is very important that every single individual, young or old, take responsibility of his/her own learning.

Although everyone manages their own learning to some extent, it is clear that just telling people to take charge of their own learning can be very inefficient. This means that a well structured and well-planned strategy needs to be developed so that individuals are well equipped with a number of learning skills so that they can manage their own learning throughout life. Self-Managed Learning (SML) is a strategy which is made up of a number of skills. The students will be equipped with a number of skills so that they can decide the goals and objective of what they are learning, gather information, process & store it and finally retain and retrieve the information as and when required. A number of techniques will be used in order to achieve these skills. As a result of which not only will the students learning be enhanced, but also the creative ability of the students will be developed. Moreover, the students will develop confidence to cope with the changing demands in their area of work and life at large. By taking responsibility of their own learning they will be able to keep themselves abreast of time. However, since our education system has hardly made any attempt in this direction and further since there is no scientific process to develop the skill to manage one's own learning, the researcher felt an urgent need to make attempts to bridge this gap.

Further, there is no doubt that the quality of a nation depends upon the quality of its citizens and the quality of its citizens depends more than on any other single factor, on the quality of their teacher. The teacher is the living ideal, the fountain head of knowledge & the potential guide to provide directive growth & development of the students of today as worthy citizens of tomorrow. However, in the course of time, need & importance of education has also changed & as a result the role and function of the teacher is also changing. Today teachers are considered as facilitators of knowledge and not dispensers of knowledge and skills. This implies that teachers are supposed to help learners to learn on their own, so that they can become independent

learners and thus take responsibility of their own learning. Moreover, the curriculum in each discipline is vast and teachers may not be able to cover the entire content in a short period of time. The solution to this problem lies in equipping the students with self-managed learning skills, so that they do not have to entirely depend on their teachers to cover the syllabus. If the teachers can help students acquire self-managed learning skills the students will turn out to be good learners not only in schools and colleges but also throughout their life. It will enable them to become life long learners. However, SML skills are not formally taught in the classrooms of today. This may be because the teachers themselves are not aware of such skills. Moreover, this aspect of self-learning is not given due importance in the teacher training program.

Teacher education program is quite different from the other academic program as the students enrolled in these courses not only have to make efforts to gain specific knowledge and skills but also have to ready themselves for shouldering a responsibility which matters to the society. To become effective teachers they need to gain a lot of understanding about the scope and dimensions of their profession, about the different roles they have to play in their professional and social life and competencies, attitudes and skills they need to develop. However the relatively shorter duration of the course has become a major factor for not being able to produce effective teachers. One way to overcome this drawback of the teacher education program is to supplement the formal study with a lot of self-study. Many efforts have been made by various institutions to initiate the students in this direction. One such program viz. Zero Lecture Program (ZLP) was conducted at IASE, Devi Ahilya Vishwavidyalaya, Indore in which the students themselves had to decide and evolve the way in which the expectations of the prescribed syllabus could be fulfilled. A similar program viz. 'Anweshana' was carried out at the Faculty of Education, Banasthali Vidyapith, Rajasthan.(2001). It was found that the most challenging task for the teacher educators in this program was to motivate the learners and keep them going on their own, since the student-teachers were products of an educational system which is teacher dominated. Due to the common tendency of students to be spoon fed they do not make any efforts in the direction of self -

managed learning. These studies show that there is an urgent need to equip learners with self-managed learning skills so that they do not become handicapped in the absence of teachers. This will not only enable the student teachers to manage their own learning during their training period but will also help them to become life-long learners. Moreover, they will be better equipped to transmit the same knowledge and skills to their students and thus turn out to be producers of life-long learners. Hence, it is felt that it is necessary to train instructors & trainees to become capable & efficient designers of SML strategy so that they can in turn produce individuals who can manage their own learning. Moreover, if such a strategy is made available it can serve as a ready to use reference material for the teacher education program so that the future teachers can be equipped with such skills.

From the review of related literature it was found that no such study has been conducted in India for the development of self-managed learning skills among student- teachers or at any other level. Although the researcher did find some studies related to development of remedial instructional strategies aimed at improving certain language skills in students. The researcher spotted a few studies conducted abroad related to self-managed learning and learning to learn skills. However, researches done in the area of self-managed learning abroad have tried to find out the perception of students regarding self- managed learning and the difficulties they face in the process of self- learning. The studies were mostly conducted on self-managed learning groups that were already present in different institutions. Hardly any study has been found in which efforts have been made to develop a strategy to enhance self-learning skills. The investigator therefore feels challenged to explore the possibilities of such a study.

1.10 RESEARCH QUESTIONS

From the various issues discussed so far in connection with learning to learn skills or self-managed learning skills several questions emerge. Some of the most pertinent of these are as follows:

1. What skills are required to manage one's own learning?

2. Which are the different techniques required to master the skills of self-managed learning (SML)?

3. Can a well structured and well planned strategy be prepared to equip an individual with self-managed learning skills?

4. How far will such a strategy help an individual to manage one's own learning?

5. What will be the opinion or reaction of the learners towards the strategy?

1.11 STATEMENT OF THE PROBLEM

"Evolving a Strategy for Developing Self-Managed Learning Skills (SML) Among Student-Teachers"

1.12 OBJECTIVES OF THE STUDY

The study has been designed to attain the following objectives:

(i) To identify various skills, sub-skills and techniques required for managing one's own learning.

(ii) To develop a strategy for enhancing self-managed learning skills among student-teachers.

(iii) To evaluate the effectiveness of the strategy in terms of

  (a) Student-teachers' performance in the achievement test.

  (b) Student-teachers' reaction towards the SML strategy.

  (c) Expert's opinion towards the strategy.

1.13 HYPOTHESIS OF THE STUDY

The prepared strategy will enhance the self-managed learning skills of the student-teachers.

1.14 OPERATIONAL DEFINITIONS OF THE KEY TERMS

Self- Managed Learning (SML) Skills

Self-managed learning skills are a set of six skills viz. Goal Setting Skill, Information Location Skill, Information Processing Skill, Information Storing Skill, Information Retention Skill and Information Retrieval Skills. These skills are elaborated further as follows:

Goal Setting Skill

Goal setting skill is a set of skills which include being able to identify one's short term goals and long term goals, carry out SWOT Analysis, set S.M.A.R.T goals, prepare goal maps, set personal goals, identifying one's learning goals, find out how one really spends ones time, use strategies on using time and use some effective aids for goal setting.

Information Location Skill

Information location skill is a set of skills which include being able to analyze the topic of study, being able to identify various search tools and collections for searching information, being able to locate and obtain information using the library and web resources, exploring copyright laws related to computer and software use, reading and evaluating the various resources of information and keeping records of them.

Information Processing Skill

Information processing skill includes a set of skills which include strategies for improving reading skill, KWL strategy, SQ3R strategy, speed reading, finger technique and identifying one's learning style.

Information Storing Skill

Information storing skill includes a set of skills for improving one's note-taking and note-making skill which include using common abbreviations, forming abbreviations, using symbols, suggestions for better listening, the Cornell system of note-taking and mind mapping.

Information Retention Skill

Information retention skill includes a set of skills to improve memory which include being able to identify the structure of human brain, being able to understand the relation between nutrition and memory improvement and exercise and memory improvement, being able to use techniques to improve information retention skill while learning, using systematic revision to improve memory after learning and using chunking to enhance retention.

Information Retrieval Skill

Information retrieval skill includes a set of skills to enable a learner to retrieve information from the long term memory for immediate use, which includes being able to form and use acronyms, abbreviations, acronymic sentence, keywords and peg words.

The enhancement in the self-managed learning skills of the student-teachers will be measured by taking into consideration the difference in scores obtained in pre-test and post-test which are based on the above six skills.

1.15 SCOPE OF THE STUDY

The present study was an attempt towards evolving a strategy for helping student-teachers to pick up learning to learn skills. However, since learning is a life long process, every individual has to continue learning throughout his life span. Everyone irrespective of age, sex, nationality and occupation need to continue learning. So the study has a widespread relevance for all those who need to manage their own learning.

1.16 DELIMITATIONS OF THE STUDY

Though every effort has been taken to make the study as generalisable as possible, it has few limitations.

1. The study was limited to the B.Ed students of Kerala state.

2. The study was delimited to the six skills for self-managed learning, identified by the researcher viz. Goal setting skill, information location skill,

information processing skill, information storing skill, information retention skill and information retrieval skill.

1.17 ORGANIZATION OF THE REPORT

The study has been presented in two parts: Volume-I and Volume-II

VOLUME - I

Chapter 1: Introduction

This chapter gives a comprehensive overview of the conceptual framework of the present study.

Chapter 2: Review of Related Literature

This chapter gives an idea about the earlier studies in the area of self- managed learning and learning to learn skills and tries to find out its implications for the present study.

Chapter 3: Plan and Procedure of the Study

This chapter gives a detailed idea about the procedure followed by the investigator for conducting the present study. The chapter has been divided into two parts. The first part deals with the methodology of developing the strategy while the second part deals with the methodology of validation of the strategy.

Chapter 4: Data Analysis and Interpretation

The chapter deals with the data collected for development of the SML strategy and finding out its effectiveness. The details regarding the data analysis and the findings of the study has been presented in this chapter.

Chapter 5: Summary

The fifth and final chapter of the first volume of the thesis is a summary of the entire study with a discussion of the major findings of the study followed by suggestions for future research.

VOLUME - II

The Self- Managed Learning strategy

The Self-Managed Learning Strategy is made up of six modules. Each module of the SML strategy deals with a different aspect of self-managed learning skill, viz. Goal Setting Skill, Information Location Skill, Information Processing Skill, Information Storing Skill, Information Retention Skill and Information Retrieval Skill. A getting started kit is also included in order to guide the student-teachers while learning through the modules.