CHAPTER II

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CHAPTER II

SELF - REGULATED LEARNING : THEORETICAL FRAMEWORK

INTRODUCTION

Learning is the focus of all educational programmes. From time to time the concept of ‘learning’ was explained differently by different theorists. A common definition for learning can be stated as “it is a relatively permanent change in a behavioural tendency, which occurs as a result of reinforced practice” (Kimble, 1961). The behavioural perspective defines learning as, “a process by which an organism acquires a new mode of behaviour as a result of its interaction in a situation, which tends to persist and affect the general behavioural pattern of the organism, to some degree”. These definitions lead to the following inferences: learning is one of the variables affecting performance; it occurs as a result of practice; most learning refers to a relatively permanent change in behaviour potential. Learning cannot be measured directly. We can make only theoretical inferences about learning based on performance. In general, learning refers to the establishment of tendencies whereas performance refers to the translation of these tendencies into behaviour. In this chapter, an attempt was made to explain an overview of learning theories with specific reference to social learning theory, self-regulation in learning and self-regulated learning strategies.

LEARNING THEORIES : AN OVERVIEW

Learning theories make statements about how and why learning takes place. Theories are more traditional and represent a broad and coherent group of general principles to explain learning (Oxendine, 1984). They are designed to synthesise all available knowledge about learning. Major learning theories address the issues of human capacities, the role of motivation, practice and insight in learning. They also address the processes of transfer and retention. Theorists differ on the degree of emphasis devoted to each of these topics. Major learning theories are categorized into two broad categories viz.
Stimulus-Response (S-R) theories and Cognitive theories. The major concepts included in Thorndike's connectionism, Guthrie's contiguity theory, Hull's reinforcement theory and Skinner's operant conditioning come under the Stimulus-Response theory. The general concepts and specific contributions of the Gestalt psychologists, Tolman's sign-gestalt theory and Lewin's field theory come under the Cognitive theories of learning.

ASSOCIATIVE Vs COGNITIVE LEARNING THEORIES

All learning depends on processes of perception, categorization and memory that mediate between environmental inputs and behavioural outputs. We might say that such mediating cognitive processes contribute to the formation of internal representations of environmental events. All the learning theorists would agree on the need for practice but would differ as to the nature of that practice. The associationists emphasize repetitive practice to groove in the response, although it must be satisfying (Thorndike's Theory). The cognitivists see it more as practice in making decisions and lay emphasis on organizing and identifying relevant cues in the environment (Tolman's Theory).

Several efforts have been made to synthesize or to point out the common elements of the S-R and the cognitive theories. Such reports have usually concluded that all major theorists agree on the importance of motivation on the part of the learner, the necessity of activity and reinforcement, a gradual or sudden recognition of the appropriate responses and recognized variation in improvement. A clearer distinction between the two groups of theories can be made when considering the role of perception. The S-R theorists maintained that stimulus is the primary concern for learning whereas the cognitivists emphasized that the "perception" is the cornerstone of learning.

SOCIAL LEARNING THEORY

For many years, behaviour theorists largely ignored the 'cognitive processes' because they thought that cognitive processes are unnecessary for a complete account of behaviour. The argument for their relative unimportance essentially depended on the view that such cognitive processes were very simple reflections of the environmental inputs that produced them. However, throughout the history of behaviour theory, there
has been evidence for the importance of cognitive processes to the determination of behaviour (Barry Schwartz, 1984). Bandura (1977) established the social learning theory which is a major outgrowth of the behavioural learning theory tradition but focuses major attention on the mental processes.

Bandura (1986) accepts most of the principles of the behavioural theories, but focuses to a much greater degree on the effects of cues on behaviour and on internal mental processes, emphasizing the effects of thought on action and action on thought. He established the concept ‘learning by modelling’.

Bandura noted that the Skinnerian emphasises on the effects of the consequences of behaviour largely ignored the phenomena of modelling (the imitation of others’ behaviour) and vicarious experience (learning from others' successes or failures). He felt that much of human learning is not shaped by its consequences, but is more efficiently learned directly from a model (Bandura, 1986). He called this type of learning from the model as “Modelling”.

Learning by modelling is also known as observational learning, learning by imitation, vicarious learning and social learning. This type of learning involves the observation of a response or a sequence of responses on the part of somebody else and later incorporation and display of these in one's own behaviour. Though the basic principle of modelling is the same, it may occur in many different ways. Bandura's (1977) analysis of observational learning involves four phases viz.: attentional phase, retention phase, reproduction phase and motivational phase. The relevance of these phases with respect to the classroom learning is described here.

The attentional phase in observational learning involves paying attention to a model. In general, students pay attention to models which are attractive, successful, interesting and popular. In the classroom the teacher draws the attention of students by presenting clear and interesting cues, by using novelty or surprise and by motivating students to pay attention. The second one is the retention phase. Once teachers have students' attention, it is time to model the behaviour they want the students to imitate and then to give them a chance to practice or rehearse. In the reproduction phase,
students try to match their behaviour to the models. In the classroom this takes the form of an assessment of students' learning. The final phase of the observational learning is motivational phase. In this phase, students will imitate a model because they feel that doing so will increase their own chances to be reinforced. In the classroom, the motivational phase of observational learning, more often consists of praise or grades given for matching the teacher's model. Students pay attention to the model, practice it and reproduce it because they have learned that this is what the teacher likes and that pleasing the teacher pays off. Effective use of Bandura's principles of modelling can increase the achievement. The process of social learning takes place in all part of life but the intensity of which varies depending upon the importance.

While most observational learning is motivated by an expectation that correctly imitating the model will lead to reinforcement, it is also important to note that people learn by seeing others reinforced or punished for engaging in certain behaviour. Learning from observing the consequences of others' behaviour is called as vicarious learning (Bandura, 1977). Classroom teachers use the principle of vicarious learning most of the time. When one student is fooling around, teachers often single out others who are working well and reinforce them for doing a good job. The misbehaving student sees that working is reinforced and gets back to work (it is hoped so).

Bandura (1977) viewed the concept of self-regulation as rewarding or punishing one's own behaviour. Later, many psychologists developed a number of theories and gave their views about self-regulation. With respect to learning, self-regulated learning is considered to be a higher order learning which emphasises motivation and feedback in learning. A detailed theoretical framework about self-regulated learning is made in this chapter.

**SELF - REGULATION IN LEARNING**

Considerable investments in theoretical and basic research over several decades have yielded insightful and detailed models of academic learning that simultaneously articulate facets of knowledge, cognition, motivation and emotion (Corno, 1993). Recently, researchers have begun to empirically study the role of students' personal attributes and
psychological processes underlying their learning and academic performance. One such aspect is known as self-regulated learning or Self-Regulation in Learning (SRL).

The origin of the concept of self-regulation was established by the Soviet psychologists in early 1980's and this tradition was taken up by the American psychologists in 1960's. Self-regulation has the origin both from social and cultural issues. After Bandura's social learning theory (1986), this concept has gained momentum.

Self-regulation is defined as the ability to behave according to one's own intention in a flexible way (Kuhl, 1992). With respect to learning self-regulation bridges the gap between academic performance and two of its determinants viz. cognitive abilities and achievement motivation (Winne, 1995). Social cognitive researchers have viewed self-regulation as an achievement of socialization processes (Bandura and Walters, 1963).

Self-regulated learning (SRL) is a cognitively inherent aspect of learning. The complexity of formation and information processing that may jointly constitute SRL. SRL is a deliberative, judgmental and adaptive process. It is principally comprised of knowledge, beliefs and learned skills. It is also viewed as a process whereby students activate and sustain cognition, behaviour and affect which are systematically oriented towards the attainment of their goals.

Self-regulation refers to students' self-generated thoughts, feelings and actions which are systematically oriented toward attainment of their goals. Zimmerman (1986) defined self-regulated learners as, those who are metacognitively, motivationally and behaviourally active participants in their own learning process. In terms of metacognitive processes, self-regulated learners plan, organize, self-instruct and self-evaluate at various stages during the acquisition processes. From the motivational view, self-regulated learners perceive themselves as self-efficacious, autonomous and intrinsically motivated. In terms of behaviour, self-regulated learners select, structure and even create social and physical environments that optimize the acquisition process. Hence, the effective learners become aware of functional relations, between their patterns of thought and action and social and environmental outcomes.
SOCIAL COGNITIVE APPROACH TO SRL

For the past three decades, social cognitive researchers have been studying various components of self-regulation such as self-reinforcement, standard setting, response inhibition, adoption of self-regulatory standards, delay of gratification, goal setting, self-efficacy perceptions, self-instructions and self-evaluation. These researches have led to the development of a unique triadic view of human self-regulation, involving personal, behavioural and environmental dimensions.

It is too difficult to explain self-regulation as an explanatory construct which involves identifying the key processes that students use to self-regulate their academic performance. An extensive number of self-regulatory processes have been proposed by different researchers. Also, more complicated processes such as volition, planning, etc. were suggested and they are overlapping with metacognition. So many theories have explained the process of self-regulation in their own view. Zimmerman (1989; 1990a) analyses the self-regulation in a triadic view and Schunk (1994) proposed the social cognitive model of SRL. They are discussed below.

TRIADIC VIEW OF SELF-REGULATION

Bandura (1986) states that human behaviour is reciprocally determined by the interaction of personal, behavioural and environmental influences. Personal influences include cognitive and affective factors. Behavioural influences are characterized by actions and reactions of an individual. Social and physical factors comprise the environmental influences. Bandura suggested that evaluative consequences produce the most stable self-control since, they are not dependent on the reactions of external agents but instead rest on one's own standards of conduct (Zimmerman, 1990a).

Students' efforts to regulate learning involve three classes of determinants: personal processes, the environment and one's own behaviour. According to the triadic view, self-regulation is the process by which an individual attempts to control the triadic factors (Personal, behavioural and environmental) to reach a goal. Hence, the triadic view of students SRL assumes the reciprocal causation among these three
influence processes. Zimmerman (1989, 1990a) viewed that the use of strategies enable the student learners to personally (self) regulate their behaviour, their environment and covert processes such as anxiety, etc. The triadic analysis of self-regulated functioning is shown in Figure 1.

**FIGURE : 1 A TRIADIC ANALYSIS OF SELF-REGULATED FUNCTIONING (ZIMMERMAN, 1989)**

Figure 1 illustrates the reciprocal nature of the three categories of determinants of self-regulation. There are three types of self-regulation viz. Behavioural, Environmental and Covert self-regulation. A student's proactive adoption of a self-evaluation strategy will provide information about accuracy and whether checking must continue through enactive feedback. In this reciprocal depiction, causation is personally (self) initiated, implemented through the use of strategies and enactively regulated through perceptions of efficacy (i.e., personal beliefs about one's capabilities to learn or perform skills at designated levels) serves as a sort of thermostat that regulates strategic efforts to acquire knowledge and skill through a cybernetic feedback loop.

A student's proactive use of an environmental manipulation strategy would influence their behaviour. The continued use of the structured setting for learning would depend upon perception of its effectiveness in assisting learning. This would be
conveyed reciprocally through an environmental feedback loop. It is well known that most of the learning strategies can be initiated from the environment. They would be labeled as self-regulated only when they come under the key personal processes such as goal-setting and self-efficacy perceptions.

Covert self-regulation is also presented in the figure. This indicates that a person's covert processes also reciprocally affect each other. It is assumed that the use of strategies (personal processes) is reciprocally regulated through a covert feedback loop. Bandura (1986) theorized that processes interact reciprocally with others within a particular triadic domain as well as with processes in other domains.

Hence, the essence of the triadic view stated that a person acts (behaviour) within a particular setting (environment) and draw conclusions (self) based on the consequences of his behaviour. According to Zimmerman (1989), this triadic self-regulation loop is initiated through the use of strategies and sustained or modified on the basis of enactive feedback. It is also assumed that a student's personal capacity to self-regulate depends upon learning and development. Therefore, it is essential to take into account the impact of variations in context and personal experience while understanding the students' self-regulated learning.

SOCIAL COGNITIVE MODEL OF SELF-REGULATION

Social cognitive theory views the development of self-regulation as an achievement of socialization processes. Social cognitive theory implies that self-regulation is comprised of three processes such as self-observation, self-judgement and self-reaction (Bandura, 1986). Zimmerman(1990b) also discussed the behavioural determinants of self-regulation. Schunk (1994) explained the social cognitive model of self-regulation on the basis of the triadic view. He argued that when the students begin the learning activities, they have some goals such as acquiring skills and knowledge, completing work and making good grades/marks etc. During these activities students observe, judge and react to their perceptions of goal progress. Hence, Schunk (1994) proposed social cognitive model of self-regulation, in which goals and self-efficacy attributes are inter-linked with self-regulation. A social cognitive model of self-regulation is shown in Figure: 2.
This model implies that effective self-regulation depends upon students' attribution that enhances self-efficacy and motivation. Attributions (belief concerning the causes of outcomes) enter into self-regulation during the self-judgement and self-reaction stages, when students compare and evaluate their performances (Schunk, 1989). In the process of goal progress that which is deemed acceptable depends upon its attribution. Students who attribute success to factors over which they have little control may hold low self-efficacy if, they believe that they cannot succeed on their own. If they believe that they lack ability to perform well, they may judge learning progress as efficient and be unmotivated to work harder. Conversely, students who attribute success to ability, effort and effective use of strategies, should experience higher self-efficacy and remain motivated to work productively. Hence, it is concluded that when students monitor their responding and attribute outcome to their strategies, their learning becomes self-regulated and they display increased self-efficacy, greater intrinsic motivation which in turn leads to higher academic achievement.
DIMENSIONAL ANALYSIS OF ACADEMIC SELF-REGULATION

Research on academic self-regulation can be distinguished by its unique task condition, learner attributes and processes. This also shares some continuities with traditional forms of learning research. There is a need for researchers to address the key questions such as why or how students self-regulate. The ‘why’ aspect includes ‘motivation’ and the ‘how’ aspect includes ‘learning methods’. Zimmerman (1994) provided a conceptual analysis of the dimensions of academic self-regulation (which is presented in Table: 1). It provides the scientific questions, psychological dimensions, task conditions for self-regulation as well as the self-regulatory attributes and processes.

TABLE : 1 CONCEPTUAL ANALYSIS OF THE DIMENSIONS OF ACADEMIC SELF-REGULATION

<table>
<thead>
<tr>
<th>Scientific Questions</th>
<th>Psychological Dimensions</th>
<th>Task conditions</th>
<th>Self-regulatory Attributes</th>
<th>Self-regulatory Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Why?</td>
<td>Motive</td>
<td>Choose to participate</td>
<td>Intrinsically or self-motivated</td>
<td>Self-goals, self-efficacy, values, attributions etc.</td>
</tr>
<tr>
<td>How?</td>
<td>Method</td>
<td>Choose method</td>
<td>Planned or automatised</td>
<td>Strategy use, relaxation etc.</td>
</tr>
<tr>
<td>Where?</td>
<td>Environmental (social)</td>
<td>Control, Social and Physical setting</td>
<td>Environmentally / Socially sensitive and resourceful</td>
<td>Environmental structuring, help seeking etc.</td>
</tr>
</tbody>
</table>

a) Scientific Questions and Psychological Dimensions

There are four scientific questions for self-regulation. The question 'why' addresses students' motivation to self-regulate their learning. Phenomenologists seek to answer this questions by studying students' self-concepts whereas attributional theorists have focused on students' interpretations of personal outcomes in terms of effort or ability. The question 'how' addresses the students methods for self-regulating their learning and performance.
The question 'what' deals with the students' efforts to self-regulate their academic performance outcomes. The question 'where' (or with whom) addresses the students' efforts to self-regulate their physical environments in order to learn.

b) Essential Task Conditions for Self-regulation

The essential task conditions necessary for a student to self-regulate the particular psychological condition is presented in the third column of the Table: 1. Zimmerman (1994) viewed that schools or research procedures that externally compel the students to participate are preventing the students from self-regulating their motivations. Hence, the students should be allowed to choose to participate, choose methods, choose performance outcomes and have a freedom to control over social and physical setting.

Learning is not possible without will and interest. The freedom of allowing the students to participate or not is the essential task for self-regulation. This freedom will increase not only the academic skills but also the intrinsic interest. The choice of methods involves the use of time. To self-regulate the academic performance, the students must be given a choice over their performance. It involves self-monitoring and self-modulating selected outcomes of one's own performance. This flexibility in selecting performance outcomes is especially important to be self-educated because, virtually all academic learning skills are multifaceted in the sense that they involve many parts that must coordinate together. The opportunity to choose or control the physical and social environment of the students allow them to increase their performance. Hence, it is well understood that allowing the students to choose or control their learning environments enables them to self-regulate effectively.

c) Self-regulatory Attributes

Self-regulatory attributes are the qualities that the students attained. The self-regulatory attributes for each psychological dimension is given in the fourth column of the Table: 1. The first attribute gives the evidence that students are more intrinsically motivated (i.e., self-motivation) when they are permitted to 'choose to participate'.
Motivation is the key factor for self-regulation and the self-motivation will improve self-regulation. The second attribute of self-regulated students is 'their reliance on a planned or automated methods of learning'. Planned approaches have often been described in terms of learning strategies. There is a research evidence that self-regulative strategies predicted students' academic performance better than cognitive strategies. Therefore, they need learning strategies that focus on self-regulatory processes. The third attribute is 'self-aware of performance outcomes'. Students' self-regulation of their academic performance is closely related to their heightened self-awareness of covert and overt outcomes. Research evidence reveals that the accuracy of one's self-monitoring directly influences one's capability to self-regulate performance outcomes. The fourth attribute is 'sensitivity to the environment and resourcefulness'. The resourcefulness of the learners enables them to organize or restructure their place of study than regular learners and they are also more likely to seek social assistance than regular students.

d) Self-regulatory Processes

The self-regulatory processes for each self-regulatory attribute is presented in the fifth column of the Table: 1. A primary source of students' intrinsic or self-motivation is their academic goals, sense of self-efficacy and values. Students' motivation to self-regulate learning is also related to their attributional processes. Effective feedback for successes supports students' sense of goal progress, sustains their motivation and increases efficacy for further learning. Strategy use is the process for the planned attribute of self-regulation. Therefore, teaching the students to use self-regulatory or metacognitive strategies can improve the effectiveness of their learning method. Research has shown that the strategy training that includes metacognitive components prepares students to know when and where to use it. The choice of performance outcomes increases the students self-awareness and behavioural control by teaching them to self-record or to know when and where to use it. The choice of performance outcomes increases the students self-awareness and behavioural control by teaching them to self-record or to cognitively self-monitor. The control over social and physical
setting will allow the students to structure their academic environment. This also increases the help seeking behaviour of the students. There is evidence that learning to self-select exemplary models to observe can be an effective way to learn.

Hence, it is concluded that academic self-regulation is not a singular aspect. It is multidimensional in scope, contextual in its application and dependent on perceived outcomes (Zimmerman, 1998). Students' interpretations of their behavioural effectiveness in each setting are as important to their success as their initial strategic skill. Their interpretation and efforts are influenced by their goals and other sources of self-motivation. To optimize the learning, students should self-regulate all major dimensions of their functioning.

**DETERMINANTS OF SELF-REGULATED LEARNING**

Zimmerman (1990a; 1990b) listed the major sources of personal, environmental and behavioural influences of SRL. They are given in Table 2.

**TABLE: 2 DETERMINANTS OF SELF-REGULATED LEARNING**

<table>
<thead>
<tr>
<th>Learning Environment Influences</th>
<th>Person (Self) Influences</th>
<th>Behavioural Influences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Context</td>
<td>Prior Knowledge</td>
<td>Self-observation</td>
</tr>
<tr>
<td>Task Features</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External Outcomes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material and Social Resources</td>
<td>Self-efficacy beliefs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Goals or intentions</td>
<td>Self-evaluations</td>
</tr>
<tr>
<td></td>
<td>Metacognitive Processes</td>
<td>Self-reactions</td>
</tr>
<tr>
<td></td>
<td>Planning</td>
<td>Environmental Structuring</td>
</tr>
<tr>
<td></td>
<td>Behavioural Control</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Affective Processes</td>
<td></td>
</tr>
</tbody>
</table>

**a) Environmental Influences**

Environmental influences are the external factors that a person can manipulate to discover whether they affect the desired outcome. The self-regulating person recognizes the physical context, the impact of positive or negative environmental stimuli on behaviour and develops a way to control them. Social dimensions of the environment
also influence SRL. Modelling or learning vicariously is a strong determinant of behaviour. Self-regulated persons selectively expose themselves to models they think will help them function better. Hence, the self-regulated learners use the environmental factors to enhance their regulatory capacity.

b) Personal Influences

Personal or self-influences are covert processes that learners use in self-regulation. It is known that prior knowledge is an important factor for our behaviour. There are two types of knowledge viz. declarative and procedural. Declarative knowledge refers to the information one possesses and procedural knowledge refers to what one knows about the processes and procedures of self-regulation. Self-efficacy is another personal influence on SRL, which refers to the extent to which a person believes that one is able to successfully complete specific tasks in a given situation. Self-efficacy has been shown to be a primary indicator of motivation to attempt and persist in a behaviour. Goal setting is another personal influence which refers to the students' initiated effort to set educational goals. Another element of personal influence is decisional or metacognitive processes. These are the higher levels of cognition that enable one to integrate general knowledge and situational information to plan and exert control over behaviour. In self-regulation, planning entails deciding when to use a strategy and how to adopt it to a particular context. Behavioural control helps one to control one's actions and related processes. The final element of personal influence on learning is affective processes which include emotions or feelings attached with the tasks (Bandura, 1986). In the learning of new behaviour, the most salient affect is anxiety which often impedes behaviour or physical functioning.

c) Behavioural Influences

The sub processes of behavioural determinants of SRL are presented in the third column of Table 2. The behavioural influences exist due to the enactment of the self-regulatory activities. They are self-observation, self-evaluation, self-reactions and environmental structuring. Self-observation refers to explicit attempts to perceive one's own
behaviour (Schunk, 1983b). i.e.) The self-regulating person employs specific strategies to increase one's activity to self-observe. Self-evaluation involves using criteria to assess the situation or problem. Self-reactions are responses to self-observations and self-evaluation about one's own behaviour and the impact of the behaviour on one's immediate environment. These reactions include altering or maintaining one's sense of efficacy to accomplish the task and deciding to continue or further modify behaviour. It includes the self-reinforcement. Self-reactions not only change behavioural aspects but also alter one's environment and personal processes. The major determinant of SRL includes environmental structuring. Social events and the physical properties of one's performance plays a major role in self-regulation. Through the social learning process, strategies to improve self-observation, self-evaluation and self-reactive responses can be acquired. It will enable learners to achieve the ultimate degree of internalization. So, it is understood that the environmental factors can assist people to become self-regulated learners.

From the triadic model of self-regulation it is found that environmental, personal and behavioural influences affect one another and the external mechanisms for increasing personal self-regulation are more important. It is assumed that students can be taught or prompted to become more self-regulated learners by acquiring effective strategies and by enhancing perceptions of self-efficacy. Students' use of SRL strategies enable them to increase their personal control over their own behaviour and immediate environment.

DEVELOPMENT OF SELF-REGULATION

Zimmerman (1990a) assumes that students' personal functioning depends upon constructive efforts by the individual to make sense out of experience and to optimize one's performance. Self-regulation requires proactive efforts to learn which involve a network of self-motivational processes such as goal-setting, self-efficacy perceptions, attributions and self-consequences as well as metacognitive learning processes such as strategic planning, monitoring and adapting. Hence, the development of self-regulation involves both cognitive and motivational factors which includes a number of social and environmental aspects. To develop self-regulation, Bandura (1986) recommended the
method of observing social models who display self-observation, judgemental processes and self-reactions and then trying actively to master these functions.

Modelling refers to cognitive, affective and behavioural changes that are derived from observing others. Models are individuals whose behaviours, verbalization and nonverbal expressions are focus of attention for observers and serve as cues for subsequent modelling (Schunk, 1987). Modelling is an important means of acquiring skills, beliefs and novel behaviours.

Bandura (1986) postulated that modelling may reflect acquisition of new behavioural patterns (Observational Learning) strengthening or weakening of behavioural inhibitions or performance of previously learned behaviours due to prompting. Observational learning occurs when observers display new behaviours that prior to modelling had a zero probability of occurrence even with motivational inducements in effect. Modelling also can strengthen or weaken inhibitions for performing previously learned behaviours. Modeled actions can serve as social prompt, as when one emulates the behaviours of high-status models to obtain approval (Schunk, 1989).

Zimmerman (1996) explained how the development of self-regulation evolves through modelling. He theorized that children's mastery of academic skills proceeds in four phases which are shown in Figure: 3.

The four phases are observation, imitation, self-control and self-regulation. In the first phase, children acquire knowledge of learning strategies through the observation of exemplary models. In the imitation phase children try to imitate the model's strategic performance. In the third phase children try to practice the model's strategy use in a self-controlled manner by which they master the strategy. Then in the fourth phase children use the adaptive strategy of self-regulation in accordance with one's personal needs. Hence, self-regulation can be developed through modelling as suggested by Bandura (1986).

The social cognitive approach to self-regulated academic learning has many advantages, among which, the following three are particularly important to educational psychologists.
1. Social cognitive approach distinguishes the effects of personal (self-) regulator influences from overt behavioural ones and can explain the relative advantage.

2. It links students' self-regulatory processes to specific social learning or behaviourally enactive experiences and can explain their reciprocal impact.

3. It identifies two key processes through which self-regulated learning is achieved, self-efficacy perceptions and strategy use and can explain their relation to student motivation and achievement in school and hence the social cognitive approach should prove helpful in guiding academic analysis and development.

**FIGURE : 3 SOCIAL COGNITIVE PHASES IN THE DEVELOPMENT OF SELF-REGULATORY SKILL**

**CHARACTERISTICS OF SELF-REGULATED LEARNERS**

Paris and Newman (1990) describe that students who construct their own cognitive and motivational tools for making their learning effective are known as 'learners who have thirst for learning'. They described these learners as self-regulative and these learners,

1. seek challenges and overcome obstacles sometimes with persistence and sometime with inventive problem-solving.
2. set realistic goals and utilize a battery of resources
3. approach academic tasks with confidence and purpose.

The combination of positive expectations, motivation and diverse strategies for problem-solving are virtues of self-regulated learners (Paris and Byrnes, 1989).

Self-regulating learners set goals for extending knowledge and sustaining motivation. They are aware of their own knowledge, beliefs, motivation and cognitive-processing elements, that jointly create situated updates of the tasks on which they work. They have a grasp of their motivation besides an awareness of their affect. They can also plan how to manage the interplay between these as they engage with a task. They also deliberate about small grain tactics and overall strategies, selecting some instead of others based on predictions about how each is able to support progress towards chosen goals (Zimmerman, 1986, 1989, Winne, 1995).

Students' personal attributes, their academic time management, practice, mastery of learning methods, goal-directedness and a sense of self-efficacy have been identified as hallmarks of academic self-regulation.

SELF-REGULATED LEARNING STRATEGIES

Learning strategies are methods or techniques that individuals use to improve their comprehension, learning, retention and retrieval of information (Weinstein and Mayer, 1986). Strategies are typically described as mental procedures that assist learning but may also include overt activities. A learning strategy may be a specific technique or tactic or it may be a general plan for completing a task.

Learning strategies and skills include any thoughts, emotions, or behaviour that facilitate studying, understanding, knowledge or skill acquisition or the reorganization of one's knowledge base. This is very much important for any student. Teaching these strategies and skills to the students will be helpful for the students to become more strategic learners who can take significant responsibility for their own learning.

The significance of learning strategies stems from the observation that learning is an active and dynamic process in which learners approach new tasks strategically, analyze tasks
requirements, apply various mental processes appropriate to the task and reflect on the success of their attainments. Effective and less-effective learners can be differentiated in terms of their strategies, and less effective students can be assisted in developing skill at strategy use through instruction. Strategy instruction has the potential to assist the learners in becoming more effective and to aid teachers in better understanding and supporting their students' mental processes and learning effectiveness.

Expert learners must also know how to use these different types of knowledge to meet their learning goals and to monitor their own progress, so that they are sufficiently flexible to alter what they are doing if a problem occurs. They need to know how to use self-assessment to determine whether they are meeting their learning goals.

Strategic learners have the metacognitive awareness and control strategies to plan and manage their own studying and learning. This involves a number of activities which interact with and dynamically influence all other components. Strategy can be understood as procedural, purposeful, effortful, willful, essential and facilitative (Alexander et al., 1998). Learning strategies are identified as procedures that the students most often apply when they are engaged in a task. Generally, procedural knowledge is referred to as strategy. Zimmerman and Martinez-pons (1986) defined the SRL strategy as those actions directed at acquiring information or skill that involve agency, purpose (goals) and instrumentality self-perceptions by a learner.

Bandura (1986) ascribed much importance to a learner's use of self-regulation strategies. In his view, strategy applications provide a learner with valuable knowledge of self-efficacy. This knowledge in turn is assumed to determine subsequent strategy selections and enactments. Students' use of SRL strategies enable them to increase their personal control over their own behaviour and immediate environment. The most sophisticated SRL strategy rely on behavioural and environmental processes to control covert personal processes in reciprocal fashion (Zimmerman and Bandura, 1994).

Self-regulated learners are assumed to understand the impact of the environment on them during acquisition process and to know how to improve that environment through the use of various strategies. Self-regulated students use academic learning
strategies in a cyclic manner and this depends upon monitoring environmental factors, personal factors as well as behavioural factors (Zimmerman and Bandura, 1994).

The purpose of self-regulatory strategy is to improve students' self-regulation of their personal functioning, academic behavioural performance and learning environment. Hence, by assisting students to learn how to use various strategies for optimizing self-processes and control their social/physical environment and behaviour, educators can help them to improve their degree of self-regulation.

CATEGORIES OF SRL STRATEGIES

The definitions of self-regulation found in the literature appear to share several attributes with the construct of metacognition. Both self-regulation and metacognition have been characterized as involving the oversight, monitoring or control of one's thinking. Also, self-regulation not only pertains to the management of one's cognitive performance, but also to the regulation of one's motivational or affective state, behaviour and social environment (Winne, 1995). Hence, it is imperative to assess the self-regulated learning strategies in terms of cognition, motivation and behaviour.

Self-regulated learning is commonly viewed as the fusion of 'skill' and 'will'. 'Skill' is generally defined as the deployment of different learning strategies including cognitive strategies, such as rehearsal and elaboration; metacognitive strategies such as planning and monitoring; and more recently volitional control strategies such as controlling one's efforts and environment in order to protect one's intention to learn. 'Will' refers to students' motivation, specifically their goals for learning (Garcia and Pintrich, 1993).

The fusion of 'skill' and 'will' requires the successful orchestration of four general categories of strategies; motivational, metacognitive, volitional and cognitive. Motivation, metacognition and volition are concerned with supporting and managing the processes that govern learning. The cognitive strategies support the processes that lead most directly to the production of knowledge.

Zimmerman and Martinez-pons (1986) identified 14 SRL strategies, based on the triadic view of learning. They have assessed these strategies by means of a structured interview. The students' use of reported strategies were verified by their teachers' rating.
It was found that, students' use of self-regulated learning strategies was highly correlated with their achievement indices and with teacher's ratings of their degree of self-regulation in class. The 14 SRL strategies identified by Zimmerman and Martinez-pons (1986) are as follows:

1. **Self-evaluation**: It refers to the student-initiated evaluations of the quality of progress of their work. Self-evaluation consists of judgement about successes and failures and a causal analysis of those outcomes.

2. **Organizing and transforming**: It includes student-initiated overt or covert rearrangement of instructional materials to improve learning. It needs student's effort on organizing the instructional material and their transformation i.e.) applying to similar situations.

3. **Goal-setting and planning**: It includes students' setting of educational goals or subgoals and planning for sequencing, timing and completing activities related to those goals.

4. **Seeking information**: Student-initiated efforts to secure further task information from nonsocial sources when undertaking an assignment. For example, from library, monographs, articles, etc.

5. **Keeping records and monitoring**: Student-initiated efforts to record events of results. Further, it includes taking notes in the class, taking hints from the discussions, keeping a list of words which are too hard, etc.

6. **Environmental structuring**: It involves the student-initiated efforts to select or rearrange the physical setting to make learning easier. For example, it includes the students' effort to turn off Radio/TV while studying, choosing isolated place to study, etc.

7. **Self-consequences**: This is a kind of self-reinforcement. It includes students' arrangement or imagination of rewards or punishment for their success or failure.

8. **Rehearsing and memorizing**: Student-initiated efforts to memorize material by overt or covert practice. It includes rehearsal of materials by telling others, by writing and connecting themselves, etc.

9-11. **Seeking Social Assistance**: It includes the student-initiated efforts to solicit help from peers (9), teachers (10) and adults (11). It involves seeking help from the friends, classmates, teachers, elders in the house, parents, etc.
12-14. **Reviewing Records**: It includes the student-initiated efforts to reread notes (12), tests (13), text books (14) to prepare for regular class or further testing.

These, 14 self-regulated strategies are taken into account for the present study.

**ASSESSMENT OF SELF-REGULATED LEARNING STRATEGIES**

Assessment of strategic learning primarily involves using self-report or introspection methods as diagnostic screening devices to identify student's strengths and weaknesses in a variety of areas related to academic success. These assessments can be used to help students becoming more aware of their current state of academic self-regulation. They also can contribute to design intervention of programmes to enhance student's strategic learning.

Assessment of students' learning strategies can take a number of forms, most of which involve some type of self-report (Garner, 1988). Because it is impossible to observe cognitive processes directly, multiple assessments are often used to obtain converging evidence of students' strategy use.

The major methods used to help externalize cognitive and metacognitive strategies are,

1. Think-aloud procedures
2. Interviews
3. Strategy - use inventories

Think-aloud procedures require students to describe what they are thinking or doing while completing an actual task which is called as introspection. Their verbalizations are concurrent with the activity, which is only interrupted long enough for the verbal report. Students' verbal reports are elicited by instructions or probes that vary in generality (Garner, 1988).

Interviews are used to elicit retrospective reports about what students have thought or done with respect to a recent task or at some time in the past. These reports focus on the cognitive and metacognitive activities that have been completed. This method is also sometimes used to obtain data about hypothetical or prototypical situations that the student has not experienced directly. Interviews are more structured
than think-aloud procedures in that at least some questions or probes are planned in advance. Other materials, such as the students' notes or a videotape of the learning situation can be used to stimulate recall (Garner, 1988).

Strategy-use inventories are similar to interviews in that they ask students to respond to past, hypothetical, or prototypical situations. They differ however, in that they are usually administered in written form. An advantage of the written format of strategy-used inventories is that they can be administered individually or to groups of students. In the present study a strategy-use inventory was developed by the investigator to assess the students' use of self-regulated learning strategies proposed by Zimmerman and Martinez-pons (1986).

CRYSTALLISATION OF SELF-REGULATED LEARNING

Education is often regarded as synonymous with learning as the acquired experience. It is the process by which and through which the experience of race (i.e.) the knowledge, skills and attitudes are transmitted to the members of the community. The main function of our present education is towards promotion of quality and excellence. The quickening pace of technological changes places more demands on citizens to assume greater responsibilities for learning new competencies. There is a growing pedagogical need to understand how students develop the capability and motivation to regulate their own learning.

Self-education has been discussed for over two centuries as a way to encourage individuals to become educated on their own, primarily by undertaking personal programmes of reading. Many educators have stressed the value of self-directed reading experiences along with personal efforts to apply this knowledge on their intellectual development. So far, there has been very little empirical evidence regarding how students become masters of their own learning.

The studies on students' learning revealed that students' failure to learn may have been due to factors other than learning ability such as insufficient motivation, lack of home support or the presence of distractions. Self-regulation has become a unifying concept bringing together diverse fields of research to provide a coherent picture of how
a learner managed the complex activities inherent in academic learning. The self-regulatory perspective shifts the focus of educational analyses from students' learning ability and environment as "fixed" entities to their personally initiated processes and responses designed to improve their ability and their environments for learning.

Effective learning requires both skill and will on the part of the learner. At a time when students often appear to lack both the will and skill to achieve academically, educators need instructional approaches that can offer direction and insight into the process of self-regulated learning. A self-regulated learning perspective on students' learning and achievement is not only distinctive, but it has profound implications for the way teachers should interact with students and the manner in which schools should be organized.

For the past three decades, social cognitive researchers have been studying various components of self-regulation such as self-reinforcement, standard setting, adoption of self-regulatory standards, goal setting, self-efficacy perceptions, self-instructions and self-evaluation. These researches have led to the development of a unique triadic view of human self-regulation involving personal, behavioural and environmental dimensions.

Academic self-regulatory processes include planning and managing time; attending to and concentration on the instruction; organizing, rehearsing and coding information strategically; establishing a productive work environment and using social resources effectively. Self-regulation also incorporates motivational processes such as setting performance goals and outcomes; holding positive beliefs about one's capabilities; valuing learning and its anticipated outcomes and experiencing positive affects with one's efforts. Self-regulated processes are not acquired overnight but rather have become refined through repeated instruction and practice.

The ultimate development of students' academic self-regulatory skill depends upon their use of self-regulated learning processes and derived forms of self-motivation such as self-efficacy. Successful adaptation to school requires that students should develop self-regulation or processes that activate and sustain cognition, behaviours and affects that are oriented toward goal attainment.
Self-regulated learners set goals and control their thoughts and behaviours to accomplish them. The dynamic interaction of goals with other self-regulatory processes is a central feature of self-regulation. Self-regulation promotes learning and the perception of greater competence. It sustains motivation towards the attainment of new goals.

Self-regulation includes the effective use of self-regulatory strategies. As already seen, SRL strategies are viewed as the actions directed at acquiring information or skill that involve agency, purpose (goals) and self-perception by a learner. Studies revealed that there are various self-regulatory strategies used by the students as well as individual differences exist in their use of SRL strategies. Students may differ in their knowledge of strategies, beliefs about strategy usefulness, understanding about the range of tasks to which strategies can be applied, attributions for successful strategy use and beliefs about what factors potentially limit their affective use of strategies. Moreover, simply teaching the students about strategies does not guarantee that students will continue to use them.

**SELF-REGULATED LEARNING AND COMPUTER ASSISTED INSTRUCTION**

The major goal of self-regulatory perspective is to enhance the students' use of self-regulated learning strategies. Strategy use depends upon students' understanding of how to use the strategy in the personal contexts and believing that strategy use will raise their performance in those settings. This requires periodic refresher instruction and practice.

In most classrooms there is typically a little opportunity for self-regulation. Hence, by collaborating with teachers, the educational researchers/investigators can prepare the instructional materials and guide the students to make choices and allow them freedom in such areas as methods, time and resources. Hence, we can train the students for the self-regulatory development.

As children grow into adolescence, their academic self-perception becomes more accurate. They develop an increasingly differentiated understanding of academic tasks and their monitoring of the differential effectiveness of cognitive strategies for learning grows with age. These changes depend upon children's building personal theories of self-competence, academic tasks, cognitive strategies, motivation and social cognition in the classroom.
The psychological principles behind CAI have been seen in Chapter-I. It is quite obvious that the psychological principles, strategies and methodologies of computer assisted instruction come more or less close to the self-regulatory strategies suggested by Zimmerman and Martinez-pons (1986). Also, research evidence reveals that the instructional techniques can be used for the development of self-regulatory strategies. It is argued that instructional planning must address the relationship between the affective, behavioural and cognitive variables. It is also suggested that flexibility in selecting performance outcomes is especially important to become self-regulated because virtually all academic learning skills are multifaceted, in the sense that they involve many parts that must be coordinated together.

Therefore, it is possible to develop self-regulated learning strategies by providing different modes of CAI. Research also reveals that CAI is the effective way of providing instruction by which one could develop a number of skills. This in turn will increase the academic achievement of students. Also, it is possible that self-regulation in learning will enhance the effectiveness of the computer as a medium of instruction.