Chapter 2

REVIEW OF RELATED LITERATURE

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2.1 INTRODUCTION

The present chapter deals with the review of the related studies. The various studies reviewed involving strategies belonged either to the category of cognitive or meta-cognitive strategies. A cognitive strategy, as Weinstein and Meyer (1991) define, is a plan for orchestrating cognitive resources such as attention and long- term memory to help reach a learning goal. Cognitive strategies, thus, focus on attainment of instructional goals. On the other hand, meta-cognitive strategies are strategies that focus on the learners' capacity to monitor and regulate their own ways of learning. They generally refer to the on-going performance of the learning process and the cognitive control measures taken to monitor, regulate and evaluate one's own cognitive processes. The meta-cognitive strategies that are widely used are task-orientation, task-planning, self-monitoring, self-regulation and self-evaluation. The use of strategies such as these make the learners move from dependence to independence. Apart from cognitive and meta-cognitive strategies, a few studies that are reviewed belonged to the category of study skills. Also, since the present study involved development of modules, studies related to development of self-instructional materials have been reviewed. In short, the studies reviewed in connection with the present study have been classified into the following four categories:

(i) Studies related to the development of self-instructional materials

(ii) Studies related to cognitive strategies,

(iii) Studies related to meta-cognitive strategies, and

(iv) Studies related to study skills/self-managed learning.

2.2 STUDIES RELATED TO THE DEVELOPMENT OF SELF-INSTRUCTIONAL MATERIAL

Kapfer, P.G. (1968) conducted a study for finding out the requirements for developing an instructional management strategy for individualized learning.

The main objective of the study was to find out the requirements for developing learning packages which would help teachers structure a program that would allow pupil to learn at the pace and depth best suited to their ability. From the study it was found that the assumptions on which learning packages should be prepared are as follows: (1)The pupils' responsibility is to learn and the teachers' responsibility is to make available to the pupil that which is to be learned. (2) The subject matter of a course must be appropriate to a learner. (3) The size of a group, the composition of a group, and the time allotted to a group should be appropriate to the purposes of the group. (4) Before truly individualized instruction can become a reality, learning packages are needed which will provide for self-paced rather than group paced instruction. It was concluded that learning packages meant for individualized instruction should include the following eight ingredients: (1) Concepts, (2) Instructional objectives, (3) Multidimensional learning materials, (4) Diversified learning activities, (5) Pre-evaluation, (6) Self-evaluation, (7) Post-evaluation and (8) Quest

Joseph, K.S. (1983) evolved a strategy for teaching English grammar at high school level.

The major objectives of the study were (i) To evolve a validated multimedia strategy for teaching English grammar at high school level; (ii) To find out the comparative effectiveness of the three forms of PLM; (iii) To find out the relationship between the pupils attitude towards multimedia strategy and their achievement in comprehensive test; (iv) To find out the relationship between students' intelligence and their performance in comprehensive test. The study has employed post-test only experimental group design. The experiment was carried out over a period of two academic years. All the twenty-eight students of Std. IX were taken as the sample for the study. The data were collected in terms of achievement of the students

through the strategy, a reaction scale developed by the investigator and a questionnaire to find out experts' opinion. Data analysis of the achievement tests were carried out by finding out the mean, S.D., and percentiles of the scores of both the comprehensive as well as the unit tests. The reaction scale was analysed by calculating the percentage responses for each alternative in every item while experts' opinion were analysed qualitatively. The major findings suggested that about ninety per cent of the students scored sixty per cent or more marks in five out of nine units. In the rest of the units thirty to eighty per cent students scored sixty per cent or more marks. Both the students and experts had expressed a highly positive reaction towards the instructional strategy. The branching PLM was found to be most effective in terms of achievement and ranking by the students. It was also found that there is no significant relationship between students' attitude and achievement but there was a significant positive relationship between intelligence and achievement of the students.

Bedient, D. et al. (1984) conducted a study entitled " Self-Instructional Materials for Underprepared Science Students."

The main purpose of the study was to design self-instructional modules for improving the knowledge base of students enrolled in the zoology course of Southern Illinois University at Carbondale. A number of goals were established for the modules which are as follows: (i) To eliminate confusion in the learners by making them know what they are to do and when, (ii) To maintain the involvement of the students during the learning process, (iii) To match the treatment of content with the attention span of the students, (iv) To prepare a slide-tape with handouts format that allows for self-instruction, repetition and interaction with printed material. The modules were prepared in such a way that all concerned can use them. They were prepared by keeping in mind the mastery learning approach to promote higher student performance. The materials were more precisely packed and presented and permitted repetition with opportunities for self-assessment. The modules were prepared by following the procedures explained below: Procedure 1: Attempts were made to motivate the learners by posing questions and examples

relevant to their experiences. Objectives were provided as another method of preparing students for what was to be studied. The objectives were measurable, with many at the knowledge level. Procedure 2: The students were given a copy of the objectives prior to studying a module. In each case, the objectives were arranged in the same order as the content. The content was also evident in the student handouts. Vocabulary lists were prepared since many students are unfamiliar with the terminology. Procedure 3: Arrows and lines were used in the visuals so that students would know exactly where to look. Graphic materials were included which had "exploded" illustrations. Highlighting helped direct student attention to other pertinent points. Procedure 4: Handouts were another mechanism which provided for learner activity. It contained several grids which listed important concepts. Students completed these grids while working through the modules. Procedure 5: Feedbacks were accommodated as the students completed each item. Procedure 6: Provisions were provided for numerous questions that required thinking. Some tactics like relating the unknown to the known, etc. were also used to enhance the learning process. Procedure 7: The modules were produced as self-instructional slide-tapes so that students could control the pace of the presentation, repeat segments, stop and resume, etc.

For evaluating the modules, after initial writing, all scripts were shared with several colleagues so they could review them and suggest improvement. The students also evaluated the materials. The test performance of students was analyzed to determine where modifications might be needed. The mean student score has been above 72% since the introduction of the modules. This performance was deemed acceptable. The experts who evaluated the modules were also positive about the materials and its design.

Khirwadkar, A.R. (1998) carried out a study entitled "Development of computer software for learning Chemistry at Std. XI."

The main objectives of the study were: (1) To develop CAI packages in subject of Chemistry for Std. XI science students, studying GSTB syllabus. (2) To study the effectiveness of the software packages in terms of instruction time and achievement

of students. (3) To study the effect of the software package on students' achievement in relation to students' (a) intelligence level, (b) motivational level and (c) attitude towards the package. (4) To study the attitude of the students and teachers regarding the effectiveness of the CAI packages. The study being developmental cum experimental in nature was conducted in two phases. Phase 1 included development of the software package and Phase 2 included implementation of the package to find its effectiveness. The tools used for the study included achievement tests (pre-test and post-test), unstructured interview schedule, structured interview schedule, Attitude scale, JIM scale, Madhookar Patel's intelligence test (MPIT). The sample of the study consisted of one English medium school in Baroda, following GSTB syllabus. All the students of Std. XI of the school were administered the motivation scale and IQ test and based on their scores, two groups were made i.e. EG and CG. The students of EG were taught three units of Chemistry using software packages while students of CG were taught through regular school teacher. After completion of 3 units post-test was administered. Data were analysed using analysis of variance and analysis of co-variance and qualitative analysis. The major findings of the study were as follows: (1) The software packages were effective in terms of students' achievement. (2) CAI was found to be time effective. (3) Academic achievement of students of the EG was found to be affected by the variables like IQ, academic motivation and attitude. (4) The EG had positive attitude about various aspects of CAI package.

Gogoi, B. (2007) conducted a study entitled "Development of self-learning material and its effectiveness for teaching general science to class IX students of Assam state.

The objectives of the study were (1) To develop self-learning material in general science for class IX students (2) To study the effectiveness of self-learning material in terms of performance in criterion test and reaction towards self-learning material. Sample of the study consisted of fifty-eight students of class IX of a school in Assam. The study employed non-equivalent control group design. Each of the control group and experimental group constituted of twenty-nine students. The students of the experimental group learned through the self-learning material.

Criterion test, reaction scale, Scientific reasoning test (Mahapatra, 1993), Scientific attitude scale (Srivastava, 1997), and Intelligence Test (Asthana and Verma, 1989) were used for the study. Treatment consisted of thirty-four periods each of forty minutes. Data were analysed using t-test, Chi-square and ANCOVA. The major finding of the study was that the self-learning material was found to be effective in terms of performance of the students on the criterion tests and their reaction towards the self-learning material.

Sharma, D. (2008) conducted a study entitled "Development, Empirical validation and effectiveness of modules on Genetics for 11^{th} Grade students.

The objectives of the study were: (1) To develop modules on genetics for 11^{th} Grade students. (2) To empirically validate the modules. (3) to find out he difference between the mean scores of students taught through conventional method and modular approach. (4) To find out the difference between the mean scores of male and female students taught through modular approach. The study had employed experimental group-control group-post-test design. The sample of 2, 6, and 72 (36+36) students for individual try-out, small group try-out and field try-out, respectively, were drawn through compatible sampling techniques. Seven modules were systematically developed on various units of genetics. These were used as learning tools. The measuring tools, namely, Criterion Reference Test and Attitude Scale were used for the study. The time period of 3 months for the field study at the rate one hour daily. The data were analysed by computing error rate, mean, S.D., and t-value. The major finding of the study was that modular approach was found to be effective than conventional method for teaching genetics.

From the review of studies related to development of self-instructional materials, the researcher gained insight into the process of development of strategies/modules. Some of the implications that could be drawn from the review, regarding the preparation of self-instructional materials are as follows: (1) The self-instructional materials should make the learners know what they are to do and when; (2) They should maintain the involvement of the learners during the learning process; (3) Graphic materials and highlighting should be used to help direct learner attention;

(4) Feedbacks should be accommodated as the learners complete each item in the module; (5) Learning packages should provide for self-paced rather than group paced instruction; (6) Learning packages should include the following components: (a) instructional objectives, (b) concepts, (c) multidimensional learning materials, (d) diversified learning materials, (e) self-evaluation, (f) quest.

The review of literature related to development of self-instructional materials also reveals the following trends from the point of view of methodology adopted by the researchers. (1) In almost all the cases the self-instructional materials were prepared for teaching of a particular subject like General Science (Bedient, et al. 1984; Gogoi, 2007), Chemistry (Khirwadkar, 1998), Biology (Sharma, 2008), English grammar (Joseph, 1983). (2) Only one study tried to find out the requirements for developing self-instructional materials for individualized learning. (Kapfer, 1968). (3) No study was found, which tried to develop learning to learn skills in general, that could be used for learning all the subjects. (4) Most of the studies aimed at improving learning of students at the school level (Gogoi, 2007; Joseph, 1983; Khirwadkar, 1998; Sharma, 2008). (5) In all the studies there was a positive change in the students' performance since the introduction of self-instructional materials. (6) Most of the studies used pre-test-post-test-control group design (Gogoi, 2007; Khirwadkar, 1998; Sharma, 2008). (7) In most of the studies evaluation of the strategies was based on performance in achievement tests, and attitude of experts' and learners towards the strategy. (8) Data were analysed using data analysis techniques like mean, S.D., t-test, ANOVA (9) In all the cases, self-learning method using modules was found to be more effective than the traditional lecture method. (10) Again in all the cases, the learners found the self-instructional materials very useful for learning.

2.3 STUDIES RELATED TO COGNITIVE STRATEGIES

As explained above, cognitive strategies are strategies that focus directly on attainment of instructional goals. The investigator reviewed few such studies that were found to have bearing on the present study and their abstracts are given below:

Dixit, S. (1988) carried out a study entitled "Information processing: An analysis of the acquisition of learning."

The study is an attempt to find out different structures and components of the strategies for acquiring and processing information, and the variance in strategies due to certain demographic factors. The objective of the study was to find out the various information-acquisition strategies, and to find out the relationship between information-acquisition strategies and certain demographic factors. The sample comprised four hundred and forty eight students of Grades X, XI and XII drawn from four English-medium schools of Baroda, using a cluster random sampling procedure. The tools used were: Information Acquisition Inventory, a Schedule of Demographic Information, and Raven's Standard Progressive Matrices. Data were analyzed using factor analysis, correlation, multiple regression analysis, analysis of variance, and 't' test. The major findings of the study are: (1) Eleven factors extracted from thirty-five strategies were found to represent the principal strategies of learning. These were: deep processing, elaborative processing, fact retention, information dependence, success dependence, prediction-orientation, organization-orientation, precision-orientation, knowledge of results, methodical study, and inferential measurement. (2) Performance in mathematics was found to be significantly related to deep-processing, while IQ was significantly related to success-dependence and prediction-orientation factors. (3) Sex, birth-order and number of siblings were not associated with the selection of any particular learning strategy, whereas type of family, parents' education and income were found to affect the selection of learning strategies. (4) Selection of strategies was independent of students' IQ and achievement in mathematics, language or science subjects.

Gaya, Tushar Kanta (1988) carried out a study entitled "Listening: Its nature, skill and training."

The study attempts to address the problem of listening as a subject of research investigation. Investigation in the area of relationship between listening and other abilities, material effects on listening, listening skills, training to listen have also been described. The objective of the study was to describe the nature, skill and

training issues related to listening, which is one of the important objectives of language teaching. The methodology followed is chiefly a descriptive one, coupled with review of empirical results. The major findings of the study are : (1) Listening ability is used to a greater extent than any other communication ability such as reading, writing and speaking. (2) There are four levels of listening. The first is mood listening. The purpose of second level is relaxation, escape, getting one's mind off something. The third level seeks answers as a key to action. This form of listening does not require sustained concentration. The fourth level of listening is the stage of analytical and critical listening. (3) The correlation between listening and IQ varies from investigation to investigation. (4) The human mind is capable of processing information at a faster rate than the human speech organs are capable of producing speech. (5) Listening skill is a fundamental language skill as well as a receptive communication skill. (6) Training to listen is possible. Training increases the ability to listen.

Vyas, J.G. (1992) carried out a study entitled "An experimental comparison of the effectiveness of exemplar and attributal strategies in concept learning with reference to students' cognitive style."

The study attempts to compare the effectiveness of exemplar and attributal strategies to concept learning and to relate this to the learners' cognitive style. The objectives of the study were: (1) To study the effectiveness of exemplar, attributal and both exemplar and attributal strategy on concept learning. (2) To study the effect of students' cognitive style on their concept learning and (3) To study the interactive effect of learning strategies and cognitive style on concept learning. The sample consisted of three hundred girl students of standard VIII drawn from a girls' high school of Bhavnagar. The sample was purposive in nature. A3 (Learning strategy) x 2 (cognitive style) design was employed. The tools used included four concept learning tests developed to measure students' concept learning achievement, and a Gujarati adaptation of the Group Embedded Figures Test (GEFT). The hypothesis were tested by the use of two-way ANOVA, and 't' test. The major findings of the study are: (1) The combined exemplar and attributal strategy was found to be the

most effective strategy of concept learning at all stages. (2) Field-independent cognitive style appeared to be more effective than field-dependent style for concept learning at all stages. (3) The interactive effects of concept learning strategies and cognitive styles were significant only for the "on-task" and "retention" test conditions. The interactive effect was not significant for the post-test condition.

Prakash, P. (1998) carried out a study entitled "Development of reading proficiency: Relationship with meta-linguistic awareness and cognitive processing skills."

The study focuses on the problem of the development of reading proficiency as related to meta-lingual awareness and cognitive processing skill. The objective of the study was to study reading acquisition process as related to the development and simultaneous/successive processing skills in the Indian orthographic context. A good Oriya medium school was selected. Later from within the grades, subjects were selected randomly. Tools used include Ravens Coloured Progressive Matrices, Oriya Graded Oral Reading Test and Reading Comprehension Test of Mohanty, Tests of Meta-linguistic awareness, Tests of Simultaneous-Successive Processing Skills and Reading Awareness Test. The collected data were treated using descriptive statistics, correlation, principal component analysis and step-wise multiple regression analysis. The major findings of the study are: (1) As the children moved from Grade I to Grade V, the relative importance of linguistic awareness at lexical and syntactic levels increased. (2) Successive processing skill was important for reading proficiency in earlier grades, whereas simultaneous processing skill was found to be more salient at the later grades. (3) Reading comprehension was found to be a complex process involving several component skills at phonological, lexical, syntactic and pragmatic levels. Taken individually, each of the skills was necessary but not sufficient for good comprehension.

Chiou, Chei-Chang (2008) conducted a study on the effect of concept mapping on students' learning achievements and interests.

The study tried to examine whether concept mapping can be used to help students to improve their learning achievement and interests. The participants were one hundred

and twenty-four students from two classes enrolled in an advanced accounting course at the School of Management of a university in Taiwan. The experimental data revealed two important results. First, adopting a concept mapping strategy can significantly improve students' learning achievement compared to using a traditional expository teaching method. Second, most of the students were satisfied with using concept mapping in an advanced accounting course. They indicated that concept mapping can help them to understand, integrate and clarify accounting concepts and also enhance their interests in learning accounting.

Aydin, S. et al. (2009) conducted a study on the contribution of constructivist instruction accompanied by concept mapping in enhancing pre-service chemistry teachers' conceptual understanding of chemistry in the laboratory course.

The present study aimed to evaluate whether a chemistry laboratory course called "Laboratory Experiments in Science Education" based on constructivist instruction accompanied with concept mapping enhanced pre-service chemistry teachers' conceptual understanding. The purpose of the study was three-fold : (1) To detect the conceptions of pre-service chemistry teachers regarding different chemistry concepts at the beginning of the semester. (2) To evaluate the course design considering constructivist instruction accompanied by concept mapping whether it contributes conceptual understanding of chemistry to the participants. (3) To get participants' ideas related to the course. The sample of the study consisted of five pre-service chemistry teachers who enrolled in the course in the Dept. of the Secondary Science and Mathematics Education. Data were collected form the sample by means of a concept test and semi-structured interviews. The course designed mainly based on discussions and concept mapping as a teaching strategy tested for twelve weeks. The major findings of the study were (1) Pre-service teachers had some alternative conceptions about chemistry topics. (2) It was found that by using constructivist instruction accompanied with concept maps as an instructional tool was effective to promote conceptual understanding. The participants found concept maps very useful in recognizing the relation between different chemistry concepts.

Joshua, A. (2010) carried out a study entitled "Applied cognition in reading: An analysis of reading comprehension in secondary school students."

This research sought to add to a body of knowledge that is severely under represented in the scientific literature, reading comprehension in secondary students. Chapter one examines the current state of literacy in the nations' public schools and the consequences that arise if students leave high school with inadequate reading skills. It discusses the neurological processes involved with reading and posits that independent silent reading (ISR) combined with scaffolding techniques may prove to be an effective method for addressing reading comprehension. The review also analyzes the components believed to be essential to reading, including vocabulary development, prior knowledge and background information, inference and prediction, and cognitive and meta-cognitive strategies. It argues that technological tools may have the potential to address these components within the framework of ISR. Chapter two details the experiment that tested these hypotheses. The study implemented an ISR program across a five month semester in a public high school and included 145 participants from nine tenth grade literature classes. The control group took part in no ISR, one treatment group participated in weekly ISR read from a textbook, and another treatment group participated in weekly ISR read from a computer module designed to address the components of reading comprehension. Students were measured on multiple achievement and motivational assessments. Results indicated that students from the ISR groups made greater gains than the control group in total reading ability, reading comprehension, end-of-course reading scores, and success/ability attribution, but no difference emerged on the vocabulary assessment. The computer module ISR group performed similarly in most respects to the textbook ISR group, but students in the computer module ISR group increased in their reading motivation and scored better on the individual reading assignments, suggesting the cognitive tools assisted them in understanding specific material at hand.

Leonard, M. (2010) conducted a study entitled "The relationship between reading fluency, writing fluency, and reading comprehension in suburban third grade students."

The purpose of the study was to examine the relationships between reading fluency, writing fluency, and reading comprehension. First, using the principles of assessing reading fluency, a writing assessment was designed and the writing fluency of fifty-four third graders were measured. Quasi-experimental research design was employed. The control group (n=36) were taught the board adopted language arts curriculum, while the experimental group (n=18) had systematic direct instruction in reading and writing fluency in addition to the regular language arts curriculum. The research questions were: What is the relationship between students reading comprehension and reading fluency among a group of third graders? What is the relationship between their reading comprehension and writing fluency? Will the experimental group of students with direct instruction in reading and writing fluency outperform the control group in reading comprehension? What other factors are involved in increasing reading comprehension? Statistical analysis like Pearsons' correlation, paired t-tests, independent samples t-tests and multiple linear regression analysis were used to analyse data. All statistical analysis was performed using PASW (formerly SPSS) of Windows. Consistent with reading research, the result showed there was a strongly positive correlation between reading comprehension and reading fluency. This study also found a correlation between reading comprehension and writing as well as a correlation between reading comprehension and writing fluency. However, the link between reading comprehension and writing fluency was not found in pre-test measurement or the post-test/pre-test measurement. The ANOVA showed that reading and writing fluency explained a statistical significant 50% of the total variance in reading comprehension scores. This study also showed a strong positive correlation between reading fluency and writing fluency in the post-test measurements. In the quasi-experimental study, the experimental group did not outperform the control group: both made significant progress.

From the review of literature related to cognitive strategies, the researcher could draw the following implications for the present study: (1) The cognitive strategies used for enhancing learning included concept mapping (Aydin, et al. 2009; Chiou, Chei-Chang, 2008); strategies for acquiring and processing information (Dixit 1988;

Prakash 1998), listening skills (Kanta, 1988) and reading skills (Prakash, 1998; Joshua, 2010). (2) It was found that concept mapping strategies can significantly improve students' learning achievement and also enhance their interest in learning. (Aydin, et al., 2009; Chiou, Chei-Chang, 2008). (3) According to Dixit (1998), the factors which represent the principal strategies of learning are deep processing, elaborative processing, fact retention, information dependence and success dependence. (4) According to Kanta (1988), listening ability is used to a greater extent than any other communication ability such as reading, writing and speaking. (5) Training to listen is possible. Training increases the ability to listen. (Kanta, 1988). (6) According to Joshua (2010), components essential to reading include vocabulary development, prior knowledge and background information, inference and prediction, and cognitive and meta-cognitive strategies.

2.4 STUDIES RELATED TO META-COGNITIVE STRATEGIES

Apart from studies based on cognitive strategies, the investigator reviewed a few studies that focused on meta-cognitive skills. These studies generally focused on the learners' capacity to monitor and regulate their own ways of learning. The summaries of those studies that are reviewed are given below.

Lee, LaVonne (1990) conducted a study to investigate whether first grade students could be taught meta-cognitive strategies to solve analogies.

The sample consisted of thirty-four first grade students. The sample was randomly assigned to two groups: experimental and control group with adjustments made to make the groups equal in gender, ability, and urban or rural geographic location. A pre-test was also taken to check their ability to solve analogies. The experimental group spent thirty minutes per day for ten days in direct instruction in analogy-solving strategies. The major findings of the study indicated that the performance of students in experimental group were significantly better than the control group.

Kaur, P. (2002) conducted a research study entitled "The effect of training on meta cognition and self-concept through English language during adolescence."

The main objectives of the study were: (1) To find out the effect of learning on meta- cognitive skills. (2) To find out difference in the performance during each treatment of experimental group class-wise, sex-wise and grade-wise. (3) To find out correlation between meta-cognition skills and age, intelligence, SES, self-concept of experimental group boys and girls of IX and XI class in Pre-test score as well as Post-test score. The sample consisted of 160 students between 14 to 16 and 16 to 17 years old. The sample was drawn from four higher Secondary Schools of Hanumangarh city, Rajasthan. There were two groups one control and other experimental matched on sex, age and grade. The study took into consideration decision making, predicting, logical reasoning, reflective thinking, creative thinking, awareness and planning components of meta-cognitive skills. In language, reading comprehension, direction writing, poster writing, poetry, letter writing, report writing, speech writing and script writing were considered for the study. Experimental method with pre-test – post-test time series control experimental group design was used in the present study. The following standardized tools were used for the study: (i) General mental ability standardized test, (ii) Socio-Economic Status level standardized test, (iii) Meta-cognitive Inventory, (iv) The test of self-concept. Self constructed tools used in the study included (i) A Questionnaire to know teachers' and students' interest (ii) Meta-cognitive Questionnaire (a) Pre-test (b) Post-test. The major findings of the study were: (1)'t' value was significant at 0.01 level between experimental group and control group in post-test. This is due to the direct effect of training imparted to the group. (2) Value of 't' was found significant at 0.01 level in all the eight items. It means there is significant difference.

Desoete, Annemie (2007) conducted a study on the effect of meta-cognition for teaching-learning process in mathematics.

The purpose of this study was to help clarify some of the paradigms on the evaluation of meta-cognition. In addition the study aimed to find out through paper reviews the effect of meta-cognition on the learning process. A longitudinal study was conducted on thirty-two children to investigate the mathematical learning and meta-cognitive skills in grade three and grade four. Meta-cognitive skills were

evaluated through teacher-ratings, think aloud protocols, prospective and retrospective child ratings. The data showed that meta- cognitive skillfulness assessed by teacher ratings accounted for 22.2% of the mathematics performances. In addition, a literature review showed that meta-cognition can be trained and has some value added in the intervention of young children solving mathematical problems.

Haider, Abdullateef (2008) conducted a study about the influence of meta-cognition on Emiratii High School students' understandings of sociometry.

The aim of this study is to investigate Emiratii High School students' understandings of sociometry, their use of meta-cognitive strategies, and the influence of students' use of meta-cognitive strategies on understandings of sociometry. Two instruments were used in this study, the first to measure students' understandings of sociometry and the second to measure students' use of meta-cognitive strategies. One-hundred and sixty-two eleventh grade students' participated in this study, out of which eighty were boys and eighty-two girls. The results showed that students' understanding of sociometry was low and students used five meta-cognitive strategies: awareness of cognition, planning, monitoring and self-checking, self-appraisal and engagement in task.

Morisano, D. (2008) conducted a study entitled "Personal Goal Setting in University Students: Effects on Academic Achievement, Executive Functioning, Personality and Mood."

Recent studies have demonstrated that goal setting leads to heightened well-being. Neuroscience research has also closely linked working memory (WM) and goal setting, because WM is related to the use of attention to activate information, for example, goal states or action plans. The present study investigated whether an intensive goal-setting program for struggling students who have experienced a substantial drop in performance would have positive effects not only on academic achievement, but also on well-being, personality, and cognitive functioning (specifically WM). Students (N= 101) experiencing subjectively perceived academic difficulty and a cumulative GPA of less than 3.0 were recruited from Mc Gill

University. Participants completed baseline measures of mood, personality, and cognition, and were randomly assigned to one or two intervention groups. Half completed an intensive goal-setting program and half a control task with intervention quality face validity. Every month for four months, students were retested on mood measures. After four months, students retested on all measures. Official transcripts were gathered at the end of the semester. Subsequent to the intervention, in order to compare grades pre and post intervention as well as retention rates, a mix of parametric (i.e., MANOVAs, t-tests, ANOVA) and non-parametric statistics (i.e., Chi squares) was used to compare group performance on dependent measures. With regard to academic achievement, the goal group performed significantly better, but all participants appeared to improve over time in mood and cognitive functioning. Applications of this research can be extended to students in university, as well as in earlier stages of education, when underperforming and dropping out have severe repercussions.

Topcu, Abdullah (2008) conducted a study on the effect of meta-cognitive knowledge on the pre-service teachers' participation in the asynchronous on-line forum.

Meta-cognitive knowledge increases learners' ability to be independent learners, which is an indispensable characteristic of distant learners. The study was carried out with thirty-two third grade pre-service teachers. Each message in the forum discussions was analyzed in terms of interaction types identified by Mc Kinnon (2000) and also scored using a grading rubric developed by the researchers. The meta-cognitive knowledge of the pre-service teachers was measured by the component of the general meta-cognition questionnaire. Sixty-seven percent of the pre-service teachers were at the high or medium-to-high meta-cognitive knowledge level and mostly sent messages having "example to idea" type interactions. Pre-service teachers who exhibited low meta-cognitive knowledge, however, mostly forwarded messages having "acknowledgments", "unsubstantial judgment", or "thoughtful query" type interactions. The findings of the study indicated that the meta-cognitive knowledge of the pre-service teachers uniquely explained 21.4% of

the variance in the online participation score and concluded by outlining some implications. Meta-cognitive knowledge has on forum discussions in relation to the constructivist approach.

Stephen, J. (2010) carried out a study entitled "Effectiveness of meta-cognitive strategies for improving reading comprehension in secondary students."

Meta-cognitive, or thinking strategies enable people to think critically, predict outcomes, implement strategies, and thus solve problems. A total of 312 students in tenth grade regular, pre-AP, and EL English classes responded to questions taken from the California STAR test and reported the meta-cognitive strategies they used in responding to the questions. The students' teachers were interviewed about the meta-cognitive strategies for reading comprehension they taught. The students who used meta-cognitive strategies scored higher in reading comprehension although the number of strategies used was not significantly related to scores. Teachers reported noticing that their AUID students, who were not identified as a special population but used meta-cognitive strategies independently more often, appeared to use more meta-cognitive strategies in the study.

King, Shannon, R. (2011) carried out a study entitled "Examining the role of goal-setting and self-monitoring on sixth grade students' motivational beliefs and performance."

The purpose of this mixed-method study was to examine the effects goal-setting and self -monitoring on 70 sixth graders' motivation and performance solving puzzles. Students were randomly assigned to one of four experimental conditions or the control group and completed scales measuring self-efficacy, self-reactions, task interest, attributions, and goal-orientation. Follow-up interviews explored students' use of self-regulation strategies. It was hypothesized that experimental group would outperform the control group on all measures. Results showed significant changes in puzzle performance, self-reactions and self-efficacy. Qualitative analysis found trends related to the self-regulation process. Educational implications of the findings and avenues for future research are considered.

The following implications could be drawn from the review of literature related to meta-cognitive strategies: (1) Meta-cognition can be trained and had some value added in the interventions. (Annemie, (2007); Kaur, (2002); Shannon, (2011); Lee, La Vonne (1990)). (2) According to study conducted by Abdullateef (2008), students mainly use five meta-cognitive strategies: awareness of cognition, planning, monitoring and self-checking, self-appraisal and engagement in risk. (3) The meta-cognitive skills considered in Kaurs' (2002) study included decision making, predicting, logical reasoning, reflective thinking, creative thinking, awareness and planning. (4) Goal-Setting as a meta-cognitive skill played an important role in students' motivational beliefs and performance. (Shannon, 2011; Morisano, 2008). (5) According to Stephen (2010), students who used meta-cognitive strategies scored higher in reading comprehension. (6) According to Abdullah (2008), meta-cognitive knowledge increases learners' ability to be independent learners.

2.5 STUDIES RELATED TO STUDY-SKILLS / SELF-MANAGED LEARNING

Apart from a few cognitive strategies and meta-cognitive strategies, the investigator reviewed a few studies related to study skills. Although these studies have not dealt with the whole range of study skills as the present study did, they have investigated on one or other study skills. As those studies were found to be of help to the investigator, they were reviewed and their abstracts are presented in what follows.

Siddheshwar, S.S. (1989) carried out a study entitled "Study of the effectiveness of the self-learning method adopted for learning prose in Marathi textbook to standard VII students."

The study is an attempt to find out the present instructional method employed to teach various language skills by guiding students to learn on their own in order to eliminate the deficiencies. The objectives of the study were as follows: (1) To decide the components to be included in the self-learning method, (2) To analyze the prose chapters to be given for self-learning, (3) To test the effectiveness of the self-learning method, and (4) To encourage students in the experimental group for self-evaluation. The sample consisted of forty students of standard VII in Shri

Chhatrapati Shivaji Maharaj Vidyaniketan, Pune. Achievement tests were used as tools. The collected data were treated using mean, S.D., 't' test and Chi square test. The major findings of the study were: (1) Students in the experimental group obtained a higher mean in the final test than the control group. (2) Almost all the students in the experimental group secured higher marks in the final test.

Lizzio, A. and Wilson, K. (2005) carried out a study "Self-Managed Learning Groups in Higher Education: Student's Perception of Process and Outcomes."

This study aimed at identifying the domain of process issues that students perceive as relevant to their participation in self-managed learning groups, and how these processes are perceived to influence group outcomes. The sample participants were undergraduate psychology students who were members of self-managed learning groups. The study used a questionnaire based on the domains identified in the study to evaluate the processes and outcomes of their learning groups. Analysis of qualitative data identified seven process domains: task focus, staff support, process learning, environmental fit, managing differences equity and responsibility, and collaboration and cooperation. Most of these factors were found to have influence on performance.

Janfeshan, K. and Rakpa, S. (2006) conducted a research study entitled "The Effect of the Study Skills on Reading Comprehension."

The main objective of the study was to determine the effect of the knowledge of reading skills on reading comprehension. Subjects were 76 freshmen randomly selected from the whole freshmen population at Kermanshah Islamic Azad University. They were male and female freshmen majoring in accounting and management. Apart from taking the two sessions of pre-test and post-test, the control group received no special treatment. The experimental group was provided not only with the textbooks but also with practical application of specific reading skills and sub-skills at each session. These skills were as follows: scanning, skimming through comprehension, critical reading, summarizing, understanding paragraph organization, note-taking and prediction. A t-test analysis was applied for

finding any differences between groups. The findings indicated that the knowledge of reading skills had a positive impact on reading comprehension.

Powell, S. Tindal, I and Millwood, R. (2008) conducted a study entitled, "Personalized Learning and the Ultraversity Experience."

The project was set up by Ultralab at Anglia Ruskin University to develop a fully online, three year duration, undergraduate degree program with an emphasis on action inquiry in the workplace. The course design aimed to provide a highly personalized word-integrated learning that is collaborative in nature, uses emerging internet technologies and accessed fully online. The focus of the study was on three aspects of personalization, namely (i) students' use of technological infrastructure to develop online communities, (ii) integration of study in the workplace, and (iii) the work-study-life balance. The students were surveyed and interviewed after the completion through questionnaire, telephone and face-to-face meetings. Transcripts were analyzed using interpretive phenomenological analysis. Overall the evidence presented showed that a course design that emphasized a high degree of trust in students' ability to self-manage learning can lead to a challenging personalized and rewarding online student experience. The study showed students demonstrating high levels of competence in managing work, study and life.

Joshi, D. (2010) conducted a research study entitled "The Efficacy of Content Based Instruction (CBI) in Learning Grammar and Developing Study Skills in English at the Secondary Stage."

The main objectives of the study were: (1) To find out secondary school students' learning needs with reference to grammar and study skills in English as a second language. (2) To find out the efficacy of CBI (Content Based Instruction) in learning grammar and developing study skills in English as a second language. (3) To find out the pedagogical and linguistic implications of CBI (Content Based Instruction) in learning grammar and developing study skills in English as a second language. Sample consisted of sixty secondary school students who were selected randomly by method of "Table of Random Number." Two groups were formed namely Experimental Group (EG) and Control Group (CG), by way of Table of Random

numbers. The research methods used included Normative Survey Method and Experimental Method. Self-made tools were used in the study which included Students' needs identification questionnaire (For students), Students' needs identification questionnaire (For teachers), Pre-test (Grammar and Study Skills), and Post-test (Grammar and Study Skills). For the research work, the Experimental Group was taught through the CBI (Content Based Instruction) for three weeks (21 days). The experimental treatment to the Experimental Group was given through the package prepared methodically. The following statistical techniques were employed for analysis and interpretation of data collected: (i) Percentage, (ii) t-test (for correlated means), (iii) Mean, (iv) Standard deviation and (v) Correlation. The major finding of the study was that content based instruction was effective method for learning grammar and developing study skills in students at secondary level.

Wang, C. (2010) carried out a study entitled "Students' characteristics, Self-Regulated Learning, Technology self-efficacy, and course outcomes in web-based courses."

The purpose of the study was to examine the relationship among students' characteristics, self-regulated learning, technology self-efficacy and course outcomes in online learning settings. 256 students participated in this study. All participants completed an online survey hosted via SurveyMonkey.com. The survey consisted of a total of 130 items with a demographic questionnaire, the Modified Motivation Strategies Learning Questionnaire, the open-ended learning strategies questionnaire, the online technology self-efficacy scale, the course satisfaction questionnaire, and the final grudges. Structural equation modeling was served as the major data analysis method. The results indicated that students with previous online learning experiences tended to have more effective learning strategies when taking online courses, and hence, had higher levels of motivation in their online courses. When students had higher levels of motivation in their online courses, their levels of technology self-efficacy increased, and their levels of course satisfaction also increased. As their levels of technology self-efficacy and course satisfaction increased, their final grade tended to be better than the students who did not have

experiences in taking online courses. In order to understand the specific learning strategies students used in taking online courses, four open-ended questions which were modified from self-regulated learning interview schedule (Zimmerman and Martinez, 1986) were used. The results indicated that the students used planners/calendars, and reviewing Black board and syllabus in order to keep up with the assignments. Most of the students took notes in terms of remembering the learning materials and some reviewed the stream videos. In addition, in order to review the learning materials, students downloaded the files posted on the blackboard and made hard copies to have everything handed while taking online courses. Students used search engines, blackboard, and online library a lot in order to obtain more information. They also reported that the e-mails and discussion boards were very useful in terms of interacting with the instructors and their classmates.

Mullin, A. (2011) conducted a research study entitled "Teacher knowledge of cognition, self-regulated learning behaviours, instructional efficacy, and self-regulated learning instructional practices in high, moderate, and low ELA achieving and moderate need elementary schools."

Schools are facing an unprecedented call to action to equip students with the knowledge and skills required to succeed in the twenty first century. To succeed as effective citizens, workers and leaders in a global economy, educators must teach students to be strategic, adaptable and self-regulated. The purpose of this study was to investigate the relationship between teachers' knowledge of cognition, self-regulated learning behaviours, instructional efficacy, and the instructional practices employed by teachers to promote self-regulated learning in students. Further, this study examined the influence of teacher self-regulated learning in students on academic achievement in moderate need elementary schools. A survey focused on self-regulation and teacher efficacy for instruction was developed from two published surveys. The survey was administered to 218 teachers from 18 elementary schools representing schools with moderate needs located in Long Island, New York. Academic achievement was measured by the percent of students that scored at

the mastery level on the Grade 3 English Language Arts Assessment for the year 2007, 2008 and 2008 combined. A paired sample t-test found that there was significant differences between teacher beliefs and instructional practices for the variables; Monitoring Strategy Use and Conditional knowledge. A one-way between groups ANOVA indicated that there were significant differences for the instructional practice variable Self-Evaluation, Declarative knowledge, Monitoring Strategy Use, and Conditional knowledge, when schools were divided into high achieving, moderate achieving, and low achieving. A correlation analysis indicated Conditional knowledge, Instructional Practices, Self Evaluation Instructional Practices, Declarative knowledge instructional practices and monitoring strategy use instructional practice were positively related to academic achievement. Results of the step wise discriminant analysis indicated that conditional knowledge instructional practices was the variable that predicted teacher positions in the achievement rankings of these schools. The findings in this study indicate that teacher self-regulated learning behaviours and the instructional practices they use to promote self-regulated learning in students influence academic achievement in English language groups.

The review of literature related to study skills/self-managed learning reveals the following trends from the point of view of methodology adopted by the researchers: (1) The study skills/reading skills used by Janfeshna and Rapka, (2006) in their study included scanning; skimming through comprehension, critical reading, summarizing, understanding paragraph organization, note-taking and prediction. (2) Study skills used by on-line learners included planners/calendars, reviewing black-board and syllabus, taking notes, downloading files posted on the black-board, using search engines and online libraries and discussions with instructors and classmates using e-mail and discussion boards. (Wang, 2010) (3) Self-learning method is more effective than traditional method. (Siddheshwar, 1989) (4) Pre-test-post-test-control group design was used in most of the studies. (Janfeshan and Rapka, 2006; Joshi, 2010) (5) Statistical methods of mean, S.D., percentage, t-test were applied for finding difference between group. (Janfeshan and Rapka, 2006; Siddheshwar, 1989; Mullin, 2011) (6) The studies related to developing study skills conducted in India

were mostly remedial instructional strategies which tried to improve certain language skills in students. (Siddheswar, 1989; Joshi, 2010) (7) Some studies conducted abroad were spotted which were related to self-managed learning. However, these studies were mainly survey type which tried to find out the perception of students regarding self-managed learning and the difficulties they faced in the process of self-learning.

2.6 IMPLICATIONS OF THE REVIEW ON THE PRESENT STUDY

The present study, as it has already been stated, is a modular multimedia strategy prepared with a view to helping pre-service B.Ed. teacher trainees to enhance their self-managed learning skills so that they, in turn, will transfer these skills to the students who would be entrusted with them when they become teachers. While attempting to locate studies that have bearing on the present study for review, the investigator did not come across any study that has dealt with the problem in its totality. However, the investigator came across a few studies that shared, if not all, but some of the attributes of the present study. Most of the studies reviewed, like the present study, were modular strategies carried out to enhance the learner knowledge or skills. These studies either focused on attainment of course objectives (cognitive strategies) or focused on the learning process with a view to enhancing learning (meta-cognitive strategies).

Reviewing of these modular strategies, be they cognitive or meta-cognitive, was of tremendous utility to the investigator. Some of the major implications that could be drawn from the review of literature for the present study are as follows: (1) Learning packages should include the following components: (a) instructional objectives, (b) concepts, (c) multidimensional learning materials, (d) diversified learning materials, (e) self-evaluation, (f) feedbacks, (g) self-paced instruction, (h) quest (Bedient, et al. 1984; Kapfer, 1968). (2) The cognitive skills that were included in the strategies were concept mapping (Aydin, et al. 2009; Chiou, Chei-Chang, 2008); strategies for acquiring and processing information (Dixit 1988; Prakash 1998), listening skills (Kanta, 1988) and reading skills (Prakash, 1998; Joshua, 2010). (3) The meta-

cognitive skills considered in the reviewed studies were awareness of cognition, planning, monitoring and self-checking, self-appraisal, engagement in risk, decision making, predicting, logical reasoning, reflective thinking, creative thinking, awareness and planning. (5) The skills needed for learning identified in the literature related to study skills were deep processing of information, elaborative processing of information, fact retention, information dependence and success dependence, scanning, skimming through comprehension, critical reading, summarizing, understanding paragraph organization, note-taking and prediction (Janfeshna and Rapka, 2006; Joshua, 2010; Dixit,1998). (7) Study skills used by on-line learners included planners/calenders, reviewing black-board and syllabus, taking notes, downloading files posted on the black-board, using search engines and online libraries and discussions with instructors and classmates using e-mail and discussion boards (Wang, 2010). (8) It was found that concept mapping strategies can significantly improve students' learning achievement and also enhance their interest in learning (Aydin, et al., 2009; Chiou, Chei-Chang, 2008). (9) Training to listen is possible. Training increases the ability to listen (Kanta, 1988). (10) Meta-cognition can be trained and had some value added in the interventions (Annemie, (2007); Kaur, (2002); Shannon, (2011); Lee, La Vonne (1990)). (11) Goal-Setting as a meta-cognitive skill played an important role in students' motivational beliefs and performance (Shannon, 2011; Morisano, 2008). (12) According to Abdullah (2008), meta-cognitive knowledge increases learners' ability to be independent learners. (13) Self-learning method is more effective than traditional method (Siddheshwar, 1989).

The review of literature not only provided the investigator with the required technological know-how as to how to develop strategies but also provided information regarding how they can be validated systematically. From the review of related studies the following trends were revealed from the point of view of methodology adopted by the researchers. (1) The studies conducted in the area of developing cognitive or meta-cognitive skills were mostly experimental in nature. (2) Pre-test-post-test-control group design was used in most of the studies (Janfeshan and Rapka, 2006; Joshi, 2010; Gogoi, 2007; Khirwadkar, 1998; Sharma,

2008). (3) Data were analysed using data analysis techniques like mean, S.D., t-test, ANOVA, percentage, etc. (Janfeshan and Rapka, 2006; Siddheshwar, 1989; Mullin, 2011; Joshi, 2010; Gogoi, 2007; Khirwadkar, 1998; Sharma, 2008). (4) In most of the studies related to development of strategies the evaluation of the strategies was based on performance in achievement tests, and attitude of experts' and learners towards the strategy. (5) In all the studies related to development of self-instructional materials there was a positive change in the students' performance since the introduction of self-instructional materials. (6) Again in all the cases, the learners found the self-instructional materials very useful for learning. (7) The studies related to developing study skills conducted in India were mostly remedial instructional strategies which tried to improve certain language skills in students (Siddheswar, 1989; Joshi, 2010). (8) In almost all the cases the self-instructional materials or strategies were prepared for teaching of a particular subject like General Science (Bedient, et al. 1984; Gogoi, 2007), Chemistry (Khirwadkar, 1998), Biology (Sharma, 2008), English grammar (Joseph, 1983; Joshi, 2010). (9) No study was found, which tried to develop learning to learn skills in general, that could be used for learning all the subjects. (10) Some studies conducted abroad were spotted which were related to self-manage learning. However, these studies were mainly survey type which tried to find out the perception of students regarding self-managed learning and the difficulties they faced in the process of self-learning. The studies were mostly conducted on self- managed learning groups that were already present in different institutions. (11) Hardly any study was found in which efforts have been made to develop a strategy to enhance self-managed learning skills among learners.

Thus from the review of literature it is clear that there is a lack of studies in the area of developing self-instructional materials for enhancing learning to learn skills among students, especially in India. The investigator therefore felt challenged to explore the possibilities of such a study.

The next chapter deals with the details regarding both the development of the modular strategy as well as its validation.