Chapter 4

ANALYSIS AND INTERPRETATION OF DATA

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4.1 INTRODUCTION

The chapter deals with the analysis and interpretation of data related to the present study. The first objective of the study was to identify various skills, sub-skills and techniques for developing SML skills among student-teachers. The second and major objective of the study was to develop a strategy for enhancing Self-Managed Learning skills (SML) among student-teachers with the help of the skills, sub-skills and techniques identified by the researcher. Finally, the last objective of the study was to find out the effectiveness of the SML strategy. Therefore the chapter has been presented in three parts:

- **Identification of the skills, sub-skills and techniques for SML**
- **Development of the SML strategy**
- **Effectiveness of the SML strategy**

4.2 IDENTIFICATION OF THE SKILLS, SUB-SKILLS AND TECHNIQUES FOR SML

The first objective of the study was to identify the various skills, sub-skills and techniques required for managing ones' own learning. To identify them the investigator studied the literature related to the various aspects of learning which included the learning theories and pedagogy, the various aspects related to effective learning and understandings into the working of the brain. The skills, sub-skills and techniques identified by the researcher were mainly based on the studies conducted by Alexander and Halverson (1963), Dave (1973), Corpley and Dave (1978); the review of related literature and the investigators' own insight and experience in the field of learning and teacher education. According to Alexander and Halverson (1963), the skills of seeking information from people, reading for information, locating information in the library, making notes and records for further reference, summarizing information, organizing data in terms of a particular problem, etc. are

some of the major skills needed for efficient learning. According to Dave (1973), learning to learn involves possession of appropriate learning skills such as the ability to set oneself learning task, to make use of the facilities available for carrying them out and to judge whether or not results meet the needs of the situation. According to Cropley and Dave (1978), self-learning involves learning to learn, learning to share knowledge, learning to evaluate oneself and learning to improve. From the above studies, the review of literature (studies related to cognitive strategies, meta-cognitive strategies and study-skills/SML) and the investigators' own experience, the gross skills and the sub-skills and techniques required for SML were identified by the researcher. After identifying the skills, sub-skills and techniques required for SML, they were finalized with the help of the researcher's Guide and three experts in the field of teacher-education.

The gross skills which were identified for managing ones' own learning are as follows:

(1) Goal Setting Skill

(2) Information Location Skill

(3) Information Processing Skill

(4) Information Storing Skill

(5) Information Retention Skill

(6) Information Retrieval Skill

After identifying the gross skills, the next step was to identify the sub-skills and techniques that are required to develop these gross skills. The sub-skills and techniques identified during the study of literature were thus categorized into the major or gross skills under which they fall. The sub-skills and techniques which fall under each of the gross skills are presented below:

The sub-skills and techniques that fall under the gross skill of Goal Setting are as follows:

(1) The skill of differentiating long-term goal from short-term goal.

(2) The skill of identifying ones strength, weakness, opportunities and threats using SWOT analysis.

(3) The skill of setting effective goals using the acronym SMART.

(4) The skill of identifying ones' life time goals.

(5) The skill of identifying ones' learning goals.

(6) The skill of preparing goal maps.

(7) The skills for effective time-management.

(8) The skill of preparing a term calendar.

(9) The skill of preparing a weekly schedule.

(10) The skill of preparing a daily to-do-list.

(11) The skill of preparing and using activity logs.

The sub-skills and techniques that fall under the gross skill of Information Location are as follows:

(1) The skill of using the various tools and resources available for information location.

(2) The skill of identifying the range of institutions where the relevant information could be found.

(3) The skill of analyzing the topic to be learned.

(4) The skill of breaking the topic of study into searchable key-words.

(5) The skill of refining the key-words in order to obtain relevant results.

(6) The skill of using the library catalogue.

(7) The skill of using the web-resources.

(8) The skill of evaluating resources used for information location.

(9) The skill of keeping appropriate records of resources used for learning.

The sub-skills and techniques that fall under the gross skill of Information Processing are as follows:

(1) The skill of explaining how the brain processes the information it gets from its surroundings.

(2) The skill of using different strategies for reading.

(3) The skill of using KWL strategy.

(4) The skill of using SQ3R technique.

(5) The skill of speed reading a text.

(6) The skill of identifying ones' learning style.

The sub-skills and techniques that fall under the gross skill of Information Storing are as follows:

(1) The skill of identifying common abbreviations and symbols used while taking notes.

(2) The skill of forming new abbreviations while taking and making notes.

(3) The skill of forming new symbols while taking and making notes.

(4) The skill of listening while taking notes.

(5) The skill of using the Cornell system for note-taking.

(6) The skill of preparing mind maps.

The sub-skills and techniques that fall under the gross skill of Information Retention are as follows:

(1) The skill of identifying the nutrients which nurture brain function.

(2) The skill of using techniques for improving memory.

(3) The skill of carrying out systematic revision of the content learnt.

(4) The skill of using the principle of chunking.

The sub-skills and techniques that fall under the gross skill of Information Retrieval are as follows:

(1) The skill of forming new acronyms for retrieving information.

(2) The skill of forming new abbreviations for retrieving information.

(3) The skill of forming new acronymic sentences for retrieving information.

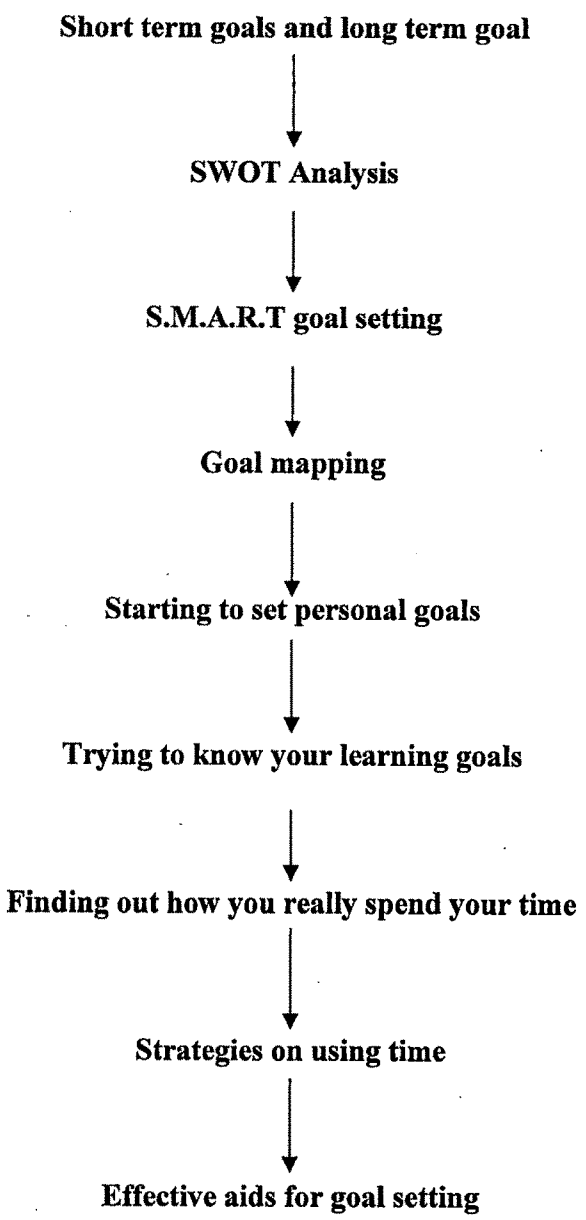
(4) The skill of using peg-words to retrieve information.

(5) The skill of using key-words to retrieve information.

4.3 DEVELOPMENT OF THE SML STRATEGY

The second objective of the study was to develop a strategy for enhancing SML skills among student-teachers. After selecting the various SML skills, the sub-skills and techniques required for developing each of the gross skills were identified, details of which has been presented in the section above. In the next step, each of the sub-skill and techniques were in turn, broken down into its components and presented in a logical order in the form of flow charts. It was decided that the strategy would consist of six units, each pertaining to the development of a SML skill. The flow charts pertaining to each skill is presented in detail in what follows. These content matters occur in the modules in the same sequence in which they are presented here.

UNIT 1 : GOAL SETTING SKILL



UNIT 2: INFORMATION LOCATION SKILL

Analyzing the topic for study

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Identifying search tools and collections to use

(a) Resources for locating Information

(b) Tools for locating Information

(c) Institutions and collections for locating Information

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Locating and obtaining resources

(a) Using Library Catalogues

(b) Using Web resources

↓

Exploring copyright Laws related to Computer and Software Use

↓

Reading and Evaluating

↓

Keeping Records

UNIT 3: INFORMATION PROCESSING SKILL

The information processing model

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Transfer of information from short-term memory to long-term memory

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Reading Inventory

↓

Strategies for improving your reading skill

↓

KWL strategy

↓

SQ3R strategy

↓

Speed Reading

↓

The Finger Technique

↓

Learning style

UNIT 4: INFORMATION STORING SKILL

Lectures and Note-taking

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Improving your notes-taking skill for lectures

(a) Some commonly used abbreviations

(b) Forming abbreviations

(c) Using symbols

(d) Suggestions for better listening

↓

The Cornell system of note taking

↓

Mind mapping

UNIT 5: INFORMATION RETENTION SKILL

The structure of the human brain

↓

The left brain and the right brain

↓

Nutrition and Memory Improvement

↓

Exercise and Memory Improvement

↓

Techniques to improve your information retention skill while learning

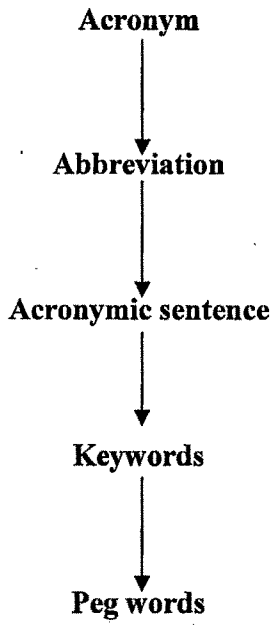
↓

Systematic revision to improve memory after learning

↓

Using chunking to enhance retention

UNIT 6: INFORMATION RETRIEVAL SKILL



Once the components were identified and presented in logical order in the form of flow charts, the next step was to write down the instructional objectives in behavioural terms. The unit-wise terminal behaviours for the complete strategy was thus specified and has been presented in detail in Chapter 3 (Part I).

From the study of literature based on learning and pedagogy and the investigators' own experience in the field of teacher-education, the assumptions on which the strategy should be based, the requirements of the strategy and the principles following which the modules should be prepared were also identified. After identifying the principles, the requirements and assumptions on which the strategy should be based, they were finalized after consulting with the research Guide and three experts in the field of teacher-education. Details of the assumptions of the strategy, requirements of the strategy and the principles of preparing the modules are presented in Chapter 3 (Part-I).

After having identified the principles, the requirements and the assumptions on which the strategy should be based a rough draft of each module was prepared. The

details regarding the development of the first draft of the strategy is presented in what follows.

4.3.1 Preparation of the First Draft of the Strategy

In the present study, self-instructional materials in the form of modules have been used to develop SML skills among student-teachers. Therefore, it was important that the learning material be presented in such manner that the learners may learn from it independently, unaided and at their own pace. There should also be an in-built flexibility in the text in order to promote interaction. It was also important to provide opportunities for self- assessment so that the learner gets immediate reinforcement which would further facilitate learning. In the section that follows the various steps followed, for the development of the first draft of the strategy has been presented:

Steps followed to develop the modules:

(i) The content of the modules was developed by using appropriate reference materials and structured in a systematic, sequential order to achieve the pre-determined objectives. The content was presented from simple to complex, from known to unknown and from concrete to abstract. Further, the content was presented in the same sequential order as shown in the flow charts.

(ii) Adequate, relevant and rich content was included for each theme so that the learners could learn without any additional support.

(iii) Attempt was made to present the content in as simple a language as possible, so as to ensure complete participation of the learners in the learning process. Since the emphasis was on self-instruction.

(iv) Prior to studying the content presented in the modules, introduction to each unit was provided so that the learners get a birds' eye view of what they are about to learn in that particular module.

(v) Since the aim of the study was to enhance SML skills among the learners, the investigator tried to make the modules as activity based as possible. This was also important so that the learners are kept active throughout the learning

process and get enough practice in order to develop a particular skill. Enough space was provided to practice the skills in the module itself.

(vi) Step-wise procedure of executing a particular skill was provided in the module. This is followed by space for executing the skill by the learner.

(vii) Illustrations and examples were provided for making the concepts more clear.

(viii) Diagrams, pictures and graphs were included wherever required.

(ix) Immediate feedback was accommodated by including answer-keys at the end of activities which had specific answers.

(x) At the end of each module, a section for reflecting on the contents learnt in the module is provided by posing several questions related to the content presented in the modules.

Some of the other points which were taken into consideration while preparing the modules are as follows:

(i) Incorporation of learning objectives at the beginning of each module.

(ii) Incorporation of summary at the end of each module.

(iii) Inclusion of tests for self-evaluation after each concept in the modules.

(iv) Simplification of language in certain sections of some modules.

(v) Presenting the list of contents at the beginning of each module.

(vi) Inclusion of references for enrichment at the end of each module.

(vii) Including pictures to make certain concepts clear.

After developing the first draft of the strategy, it was intensely reviewed by the Guide, who then provided suggestions for improvement of the same. The first draft of the strategy was then intensely reviewed by experts. Later a pilot study was

conducted, results of which were analyzed to determine where modifications might be needed.

4.3.2 Preparation of the Second Draft of the Strategy

The first draft of the SML strategy was further modified in accordance to the expert's opinion as well the insight gained from the conduct of the pilot study. The details of which have been presented below.

4.3.2.1 Modifications made in strategy after finding out experts' opinion

A copy each of the modified strategy was given to a panel of experts for going through it and giving further suggestions for improvement. The panel consisted of five experts three of whom belonged to the field of teacher education and two were experts in English language. All the experts selected had ten or more years of experience in their respective fields and also had experience in dealing with preparing strategies. The prepared material was reviewed (in the light of the objectives of the study) by experts, who were requested to provide their views with respect to the logical organization of the material, its coherence and comprehensibility. On the basis of the experts' suggestions and opinions, following changes were made in the strategy:

(i) The experts found that the modules were too concept based and required the addition of more activities since the aim of the study was to develop self-managed learning skills. Therefore the investigator added more activities and exercises and made the modules more activity based. Less emphasis was given to theory related to a particular concept.

(ii) Again space required for practice of the particular skill was provided in the module itself.

(iii) The experts found the second module related to the development of information location skill, too lengthy. The module was modified by removing unnecessary concepts and activities.

(iv) Inclusion of an example of a goal map, example of identifying a key-word from topic of study, example of a mind map, etc. was suggested to bring more clarity to the concept.

4.3.2.2 **Modifications made in strategy after conducting the pilot study**

Once the strategy was modified in the light of the suggestions given by both the research Guide and the panel of experts, it was tried on a sample of five student-teachers (different from the sample) as a pilot study. This was done with a view to finding out the possible difficulties that are likely to be encountered by the sample while studying through the modules. The investigator sat along with these five student-teachers as they learned through the modules and discussed and noted the problems as they encountered. In the light of the problems experienced by the student- teachers, the following corrections were made in the strategy:

Points that emerged from pilot study

(i) The learners needed more assistance to carry out personal SWOT analysis, in the module on developing Goal Setting Skill. In order to overcome this difficulty the investigator included some questions in the form of prompts to help the learners in determining their strength, weakness, opportunities and threats.

(ii) An example was included for explaining how to set a goal using the acronym SMART.

(iii) The concept of goal map was not clear to the learners, therefore the explanation was made more precise and the language used was further simplified.

(iv) Concept of using Boolean logic was made clear by addition of more examples.

(v) The concept of mind maps was made clearer with the addition of one more example, so that the learners get more ideas regarding construction of mind maps.

(vi) The language used in explaining the concept of chunking was simplified further. More examples were also added.

(vii) The learners asked for adding more activity to learn the skill of preparing a mind map.

(viii) More space was provided in the modules so that the learners could practice the skill of preparing goal maps and mind maps.

(ix) In order to make the concept of left and right brain, clear picture was included in the module.

(x) Picture was also included to make the concept of peg-word clear.

Further the analysis of the pre-test and post-test scores of the sample showed that there was a positive improvement in the self-managed learning skills of the student-teachers after the administration of the SML strategy. Again, all of them had a positive opinion about the prepared strategy. The investigator observed that the sample had an intrinsic motivation to learn the modules and from their interview found that they liked the strategy and found the modules very useful. The interview also reveled that the sample were keen to keep the modules with them for future reference.

4.3.3 Preparation of the Final Draft of the Strategy

The investigator once again went through the entire SML strategy and made the necessary changes not only in the language of the strategy but also in the organization of the content. Further additions and deletions were made in the strategy so as to make it more fluent and effective for learning. Thus the final draft of the strategy was made ready for intervention. A copy of the final draft of the SML strategy can be seen in the second volume of this report. The common framework that was followed to prepare the strategy has been presented in what follows:

A common framework of the modules

(i) ***Learning objectives***: This section gives an idea about the objectives that need to be achieved by the learner at the completion of the module. It tells about the skills and techniques to be learnt in that particular module.

(ii) ***Introduction*** : This section gives an overall idea about what has been presented in the module so that the learner gets a bird's eye view of what he/she is about to learn in that module.

(iii) ***Content with activities and exercises***: In this part of the module, the actual content in the form of the various concepts related to that particular skill along with examples, activities and exercises have been presented. Exercises for practice have been presented after each concept. At the end of content in all modules, some activities have been presented. If the activity has a specific answer, an answer key has been provided at the end of the activity. The activities which ask about the learner's opinions or situations do not have answer keys.

(iv) ***Test yourself***: Throughout the modules, questions to check the understanding of the contents just learnt have been presented in the form of Test Yourself sections. The answers to these questions have been provided at the end of the module.

(v) ***Summing up***: In this section the summary of the entire content presented in that particular module has been presented. This gives an opportunity to the learner to revise the content just learnt.

(vi) ***Reflections***: At the end of each module, there is a section on reflection. A number of questions related to that module are presented here. In this section, the learner writes whatever comes to their mind regarding the question at hand. These questions have no specific answers and are left to the learner's imagination.

(vii) ***References***: Readymade references in the form of books or websites have been provided at the end of each module so that the learner may enrich oneself with extra knowledge regarding a particular skill or concept.

On the basis of the suggestions and the common framework to develop the modules, all the six modules were developed and finalized after the pilot study. A copy of the same has been presented in Volume II of the report.

4.4 EFFECTIVENESS OF THE SML STRATEGY

After the final draft was prepared, the modules were put to experimentation to find their effectiveness. The data thus collected during and after the experiment were subjected to statistical analysis. The details of conducting the experiment have been presented in Chapter-III. Here below, the analysis and interpretation of data has been made under the following sections:

(i) Performance of the student-teachers in pre- test and post- test.

(ii) Opinion of the student- teachers towards the various modules of the strategy and the SML strategy as a whole.

(iii) Opinion of the experts towards the SML strategy.

4.4.1 Performance of Student-Teachers in Pre-Test and Post-Test

In the present study, the sample consisted of forty student-teachers who were randomly selected on the basis of the 'Table of Random Numbers'. The samples were systematically divided into two groups: Experimental Group (EG) and Control Group (CG). Each group consisted of twenty students. Since the third objective of the study was to find out the effectiveness of the developed strategy in terms of the student-teachers performance in the pre-test and post–test, an achievement test was prepared. The achievement test i.e. both the pre-test and post- test were prepared for the purpose of the study. Both the tests were identical but not similar. The tests were divided into six sections, each dealing with a separate aspect of the self-managed learning strategy.

The pre-test was administered to the student-teachers of both the group before the implementation of the developed strategy, in order to find out where both the group stood with respect to self-managed learning skills. After completion of the intervention course, the post-test was administered to both the experimental and control group to know the effect of the developed strategy on the experimental group student-teachers' performance.

4.4.1.1 Comparison of Control Group and Experimental Group with regard to Pre-Test scores.

In order to find out the entry level behaviour of the Experimental Group and Control Group and to equate the Experimental Group and Control Group with respect to their performance in self-managed learning skills before the intervention of the developed strategy, the Mean and Standard Deviations of the pre-test scores of both the groups were determined and were subjected to a test of significance between Means using two tailed test. The level of significance was fixed at 0.01 levels. The details of the analysis are summarized in the following table.

Table 4.1 : Test of Significance of Difference Between Means of Pre-Test Scores of EG And CG

Groups	Number of students	Mean	S.D.	t-value
Experimental	20	16.75	7.86	0.3876*
Control	20	15.75	8.44	

df = 38, t- value = 2.704 (at 0.01 level of significance)
Note: 't' value is not significant at 0.01 level.*

The table above reveals that the Experimental Group and Control Group do not differ in terms of their Self-Managed Learning Skills at the pre-test level as the calculated "t" value is less than the table value of 2.704 to be significant at 0.01 level of significance with 38 degrees of freedom. Thus it can be seen that there is no significant difference between the performances of the student-teachers at pre-test level with respect to Self-Managed Learning Skills. The pre-test scores of the Experimental Group and Control Group are presented below in the form of bar diagram for better clarity.

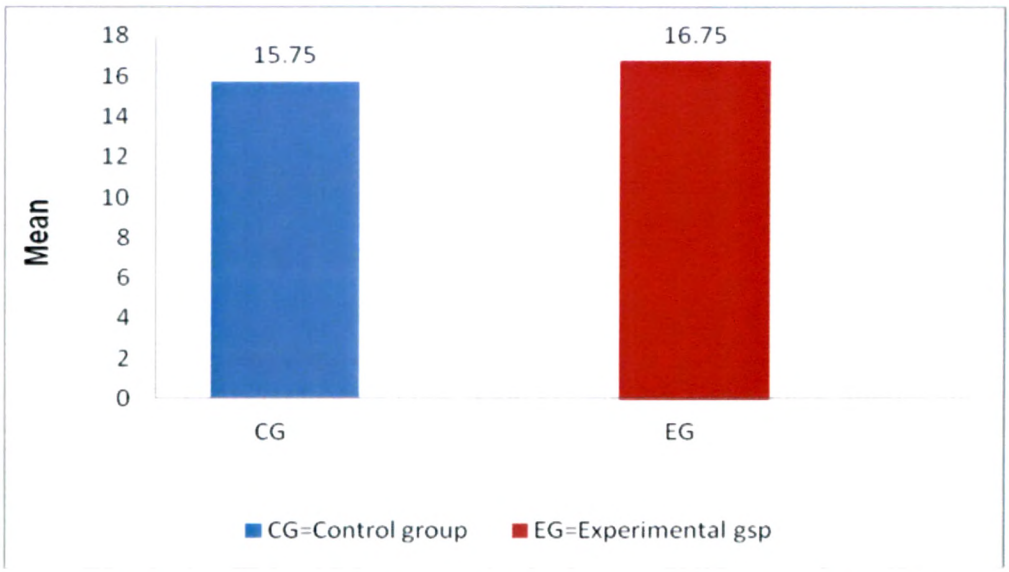


Figure 4.1 : Mean of Pre-test scores of Control Group and Experimental Group

From the Figure 4.1 it can be clearly seen that both the Experimental Group and Control Group do not differ significantly with respect to their Pre-test scores. Thus it may be concluded that both the groups were equivalent at the pre-test level.

4.4.1.2 Comparison of the Control Group and Experimental Group with Regard to Post-Test Scores

In order to find out the effectiveness of the Self-Managed Learning skills strategy, the Experimental and Control Group were subjected to a post-test after the completion of the experimental session. The SML strategy consisted of six modules related to six different skills for enhancing self-managed learning of student-teachers. The six skills were Goal Setting Skill, Information Location Skill, Information Processing Skill, Information Storing Skill, Information Retention Skill and Information Retrieval Skill. The mean and standard deviations of the post-test scores of both the groups in each skill of the strategy as well as the whole strategy were calculated and were subjected to a test of significance between Means (t test) using one tailed test. The level of significance was fixed at 0.01 level. The details of the analysis are summarized in the following table.

Table 4.2 : Test of Significance of Difference Between Means of Post-Test Scores of Experimental Group and Control Group

S. No.	Self-Managed Learning Skill	Means of Experimental Group	Means of Control Group	S.D. of Experimental Group.	S.D of Control Group	't' value
1.	Goal Setting Skill	15.5	2.15	2.96	1.24	18.06**
2.	Information Location Skill	8.5	3.65	3.5	3.04	4.68**
3.	Information Processing Skill	11.2	2.2	1.7	1.12	19.78**
4.	Information Storing Skill	16.8	4.65	2.7	3.77	11.72**
5.	Information Retention Skill	13.08	3	1.33	3.025	13.62**
6.	Information Retrieval Skill	14.5	2	3.9	2.75	11.68**
7.	**TOTAL**	81.25	17.25	11.97	5.54	21.70**

df = 38, t- value = 2.42 (at 0.01 level of significance)

*Note: ** 't' value is significant at 0.01 level.*

The table above reveals that the Experimental Group and Control Group differ to a great extent in terms of their performance in self-managed learning skills at the post-test level as the calculated "t" value 21.70 is greater than the table value of 2.42 at 0.01 levels of significance with 38 degrees of freedom. Further it is also observed that both the EG and CG group differ to a great extent in their performance in all the skills of the SML strategy. It can be clearly seen from the Means of scores of the EG and CG that the EG has performed significantly better than the CG in all the skills of the SML strategy. The Mean of the post-test scores of the Control Group and Experimental Group in all the six skills of the strategy has been presented below in the form of bar-diagram for further clarity.

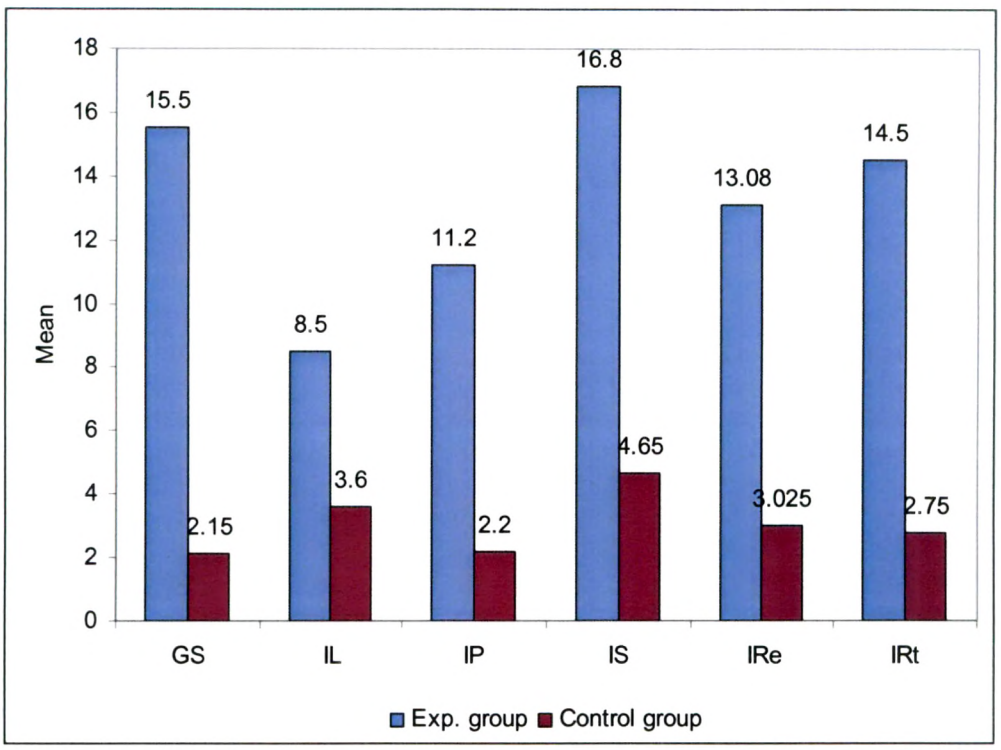


Figure 4.2 : Mean scores of E.G. and C.G. in various skills of the SML strategy.

The details of the abbreviations used in the diagram are presented below:

GS = Goal Setting Skill

IL = Information Location Skill

IP = Information Processing Skill

IS = Information Storing Skill

IRe= Information Retention Skill

IRt= Information Retrieval Skill

It can be clearly seen from the above diagram that there is a drastic difference between the performance of the EG and CG. Further it can be observed that the Experimental Group has performed extremely well in all the skills taken up in the SML strategy. The diagram also shows that the EG has performed best in the Information Storing Skill. The overall performance of the CG and EG in the post-test is depicted with the help of bar-diagram below.

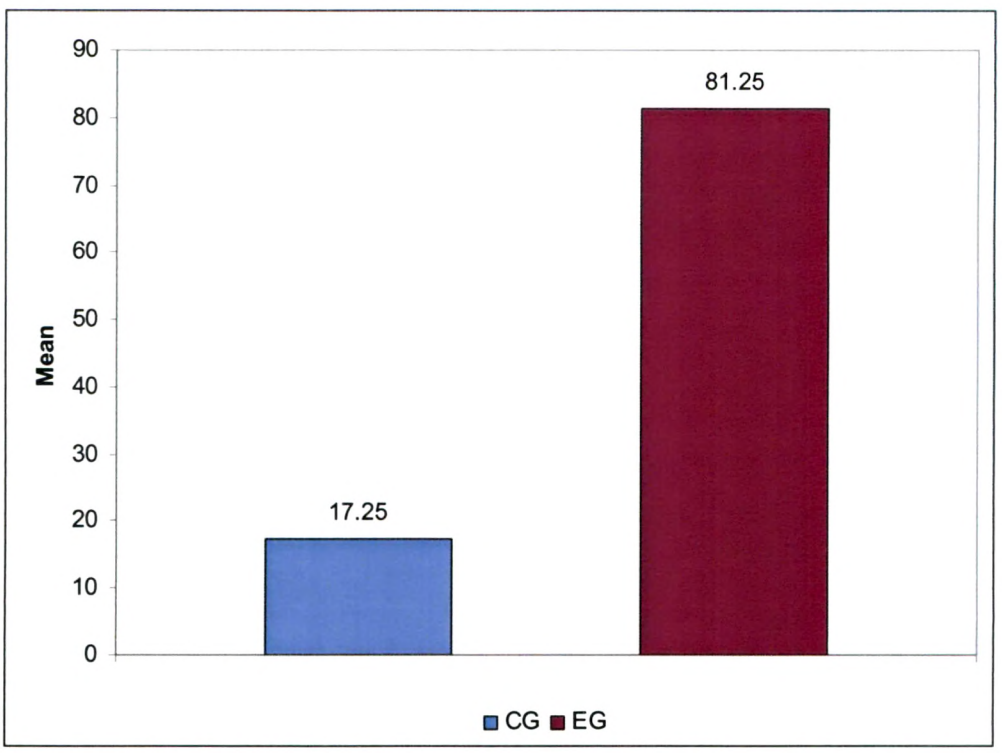


Figure 4.3 Mean of Post-Test scores of Control Group and Experimental Group

Again Figure 4.3 clearly shows that there is a large difference in performance of the CG and EG in the post-test. It can therefore be concluded that the treatment made a great impact on the EG with respect to development of self-managed learning skills. Thus the research hypothesis that there will be a significant difference between the performances of the student-teachers of the Experimental Group and Control group at post-test level after the administration of the strategy is accepted.

4.4.1.3 **Comparison of Pre-test and Post-test scores of Experimental Group**

In order to find out the effectiveness of the SML strategy, the prepared achievement tests in the form of pre-test and post-test were administered to the Experimental Group before and after the completion of the experimental session. The Mean and Standard Deviations of the pre-test and post-test scores were calculated and were subjected to a test of significance between Means using one tailed t-test. The level of significance was fixed at 0.01 level. The details of the analysis are summarized in the following table.

Table 4.3 : Test of Significance of Difference Between Means of Pre-Test and Post-Test Scores of Experimental Group

Test	Number of students	Mean	S.D.	t-value
Pre-Test	**20**	**16.75**	**7.86**	**20.144***
Post Test	**20**	**81.25**	**11.97**	

df = 38, t- value = 2.42 (at 0.01 level of significance)

*Note: ** significant at 0.01 levels of significance*

The table above reveals that the pre-test and post-test scores of the Experimental Group differ to a great extent, as the calculated "t" value 20.144 is greater than the table value of 2.42 at 0.01 level of significance with 38 degrees of freedom. Thus the research hypothesis that there will be a significant difference between the performances of the student-teachers of the experimental group at post-test level after the administration of the strategy is accepted. This is further made clearer with the help of a bar-diagram which has been presented below:

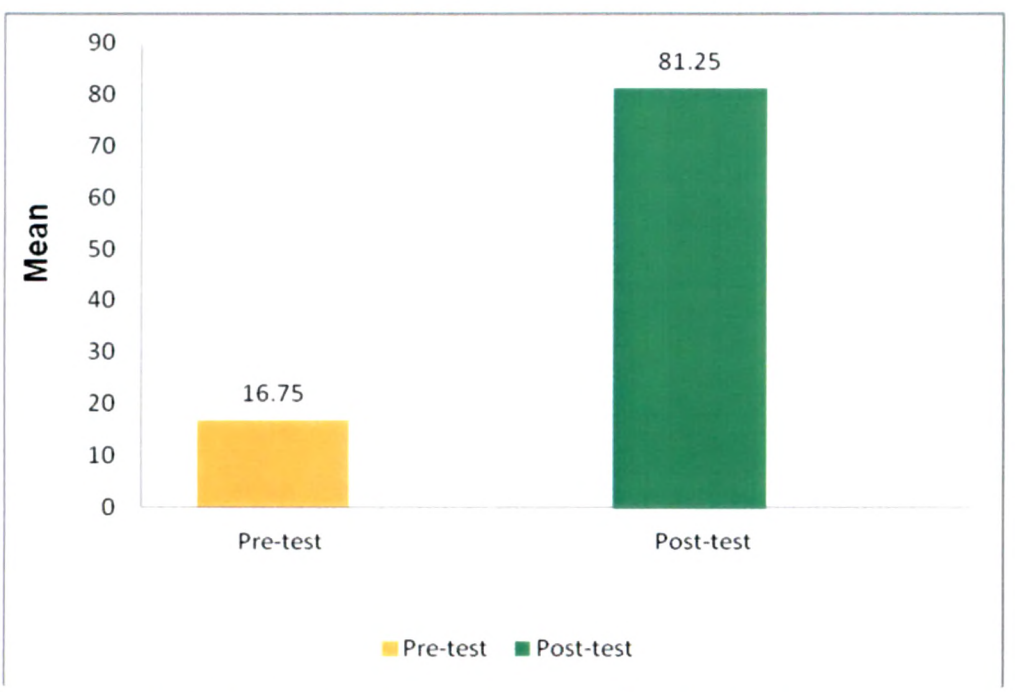


Figure 4.4 Mean of Pre-test and Post-test scores of Experimental Group

It can be seen from the above diagram that the performance of the EG in the post-test is significantly better than its performance in the pre-test. Thus, it can be said that the treatment made a great impact on the experimental group with respect to development of self-managed learning skills.

4.4.1.4 Comparison of Pre-test and Post-test scores of Control Group

In order to prove that the SML strategy is effectiveness, the prepared achievement tests in the form of pre-test and post-test were administered to the Control Group before and after the completion of the experimental session. The Means and Standard Deviations of the pre-test and post-test scores were calculated and were subjected to a test of significance between Means. The level of significance was fixed at 0.01 level. The details of the analysis are summarized in the following table.

Table 4.4 : Test of Significance of the Difference Between Means of Pre-Test and Post-Test Scores of Control Group

Test	Number of students	Mean	S.D.	t-value
Pre-Test	20	15.75	8.44	0.664*
Post-Test	20	17.25	5.54	

df = 38, t- value = 2.71 (at 0.01 level of significance)

*Note:** 't' value is not significant at 0.01 level.*

The table above reveals that the pre-test and post-test scores of the Control Group do not differ to a great extent, as the calculated "t" value 0.664 is less than the table value of 2.71 at 0.01 level of significance with 38 degrees of freedom. Thus it can be concluded that no difference was found in the performance of the control group in the self-managed learning skills. The difference in the performance of the CG in the pre-test and post-test can be clearly seen with the help of the bar-diagram presented below.

Figure 4.5 :Mean of Pre-test and Post-test scores of Control Group

From the above diagram it can be clearly noticed that there is no significant difference between the performance of the CG in the pre-test and post-test.

Conclusion

In the light of the above analysis of pre-test and post-test data of experimental group and control group, it can concluded that the performance of the Experimental Group is significantly better than that of the Control Group in all the skills taken up in the SML strategy and SML strategy as a whole. Thus the SML strategy was successful in enhancing the self-managed learning skills of the student-teachers of the Experimental Group.

4.4.1.5 **Comparative performance of student-teachers of Experimental Group in various skills of the strategy**

The SML strategy consisted of six skills viz. Goal Setting Skill, Information Location Skill, Information Processing Skill, Information Storing Skill, Information Retention Skill and Information Retrieval Skill. Accordingly the achievement test which was conducted at the beginning and at the end of the experimental treatment

was divided into six sections. In order to find out the comparative performance of the student-teachers of the experimental group in the various skills of the SML strategy, the percentage of marks obtained in each of the six sections of the post-test were calculated separately. Then the Mean of the scores obtained in each skill was calculated. The details of the comparative performance of the student-teachers in the various skills of the strategy have been presented in what follows.

Table 4.5 : Mean of Percentage of Marks Obtained by Student-Teachers of Experimental Group in Various Skills of the Strategy

Sr. No.	Name of skill	Mean of percentage of marks obtained
1.	Goal Setting Skill	77.32
2.	Information Location Skill	70.00
3.	Information Processing Skill	85.09
4.	Information Storing Skill	84.25
5.	Information Retention Skill	87.74
6.	Information Retrieval Skill	82.50

From the above analysis it is clear that the student-teachers of the Experimental Group performed well in almost all the skills of the strategy i.e. 70% and above. It can also be observed that the student-teachers performed the best in Information Retention Skill i.e. 87.74% and second best in Information Processing Skill i.e. 85.09% while the performance of the student-teachers was least in Information Location skill with Mean score of 70% followed by Goal Setting Skill in which they scored a mean of 77.3%. Overall it can be concluded that the student-teachers of the Experimental Group performed well in all the skills taken up in the SML strategy.

4.4.1.6 Student-teachers of Experimental Group performing at mastery level

After the completion of the experimental treatment, the EG and CG were subjected to a post-test. The maximum mark of post-test was 100. The marks obtained by all the 20 student-teachers of the Experimental Group in the post-test have been presented below.

Table 4.6 : Performance of EG and CG in Post-Test

Sr. No.	Marks obtained by EG in Post- test out of 100	Marks obtained by CG in Post- test out of 100
1.	82*	23.5
2.	79*	16.5
3.	88*	12
4.	92*	17
5.	69	21.5
6.	89*	20
7.	87*	12.5
8.	97*	26.5
9.	92*	10
10.	79*	12
11.	88*	23.5
12.	94*	08
13.	94*	4.5
14.	80*	12.5
15.	85*	16
16.	90*	21.5
17.	64.5	22.5
18.	56.5	09
19.	55	17.5
20.	70	27.5

Note: (*) represents scores 79 and above

As the EG was exposed to the SML strategy, there was a drastic improvement in the performance of the student-teachers of the Experimental Group in the post-test. As can be observed from the table above, none of the student-teachers scored below 50. The highest score obtained by EG in the post-test was 97 and the lowest score 55 out of 100.

Table 4.7 : Student-Teachers of EG and CG Performing at Mastery Level

Group	Pre-Test (in %)	Post-Test (in %)
Experimental (N=20)	0	75 (n = 15)
Control (N=20)	0	0 (n = 0)

From the above table it is clear that none of the student-teachers of both the Control Group and Experimental Group performed at mastery level in the pre-test. The number of student-teachers of EG who performed at mastery level in the post- test was fifteen out of total twenty student-teachers. This shows that 75% of the student-teachers of EG performed at mastery level after the administration of the SML strategy. While none of the student-teachers of the Control Group performed at mastery level in the post-test.

4.4.2 Opinion of the Student-Teachers Towards the Various Components of the SML Strategy

The third objective of the study was also to find out the effectiveness of the SML strategy in terms of the student-teachers' reaction towards the strategy. For this purpose, seven different opinionnaires using the Likert method were prepared. A five point scale ranging from strongly agree to strongly disagree was used in the opinionnaires. Six of the opinionnaires were related to the six modules constituting the strategy while one opinionnaire was prepared to know the opinion of the student-teachers towards the strategy as a whole. The opinionnaires were analysed by finding out the percentage of responses for each individual statement.

4.4.2.1 Opinion of the Experimental Group About the First Module of the Strategy (Goal Setting Skill)

To find out the opinion of the student -teachers towards the various aspects of first module of the strategy viz. Goal Setting Skill, an opinionnaire consisting of eleven statements related to the various components of the module was prepared. The data collected from the twenty student-teachers of the Experimental Group with the help of the opinionnnaire was analysed by finding out the percentage of responses of the

student-teachers in each category. The opinions in the form of percentage of responses have been presented in the table below item wise.

Table 4.8 : Analysis of Opinionnaire (Module 1)

No.	Statements	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
1.	The module on developing goal setting skill provided me with interesting new techniques for setting effective goals.	50% (10)	50% (10)			
2.	The module was easy to read.	40% (8)	60% (12)			
3.	The activities given in the module were appropriate.	10% (2)	80% (16)	10% (2)		
4.	The module has helped me identify my short term and long term goal.	25% (5)	65% (13)	10% (2)		
5.	The module has helped me identify my personal goals covering almost all important areas in my life.	5% (1)	65% (13)	30% (6)		
6.	The module has helped me understand my strengths and weaknesses which I am well placed to take advantage of while achieving my goals.	20% (4)	60% (12)	20% (4)		
7.	The module has helped me understand the points to be kept in mind for setting an effective goal.	40% (8)	55% (11)	5% (1)		
8.	The goal mapping technique helped me practice goal setting skill in the most powerful and effective way used in the present times.	25% (5)	55% (11)	20% (4)		
9.	The module has helped me to become clear about my reasons for learning.	10% (2)	65% (13)	25% (5)		
10.	The module has introduced me to a number of tools to ensure that I get the greatest benefit of the limited amount of time available to me.	30% (6)	60% (12)	10% (2)		
11.	The module has helped me to practice time management techniques for successful studying.	20% (4)	60% (12)	20% (4)		

From the above analysis it is clear that the student-teachers not only found the module easy to read and understand but also found that it contained many new methods and techniques to enhance their Goal Setting Skill. It can be clearly seen that most of the student-teachers had a favourable opinion towards the module. However, thirty percent of the student-teachers were uncertain about whether the module had helped them identify their personal goals covering almost all important areas of their life. Again, twenty percent of the student-teachers were uncertain whether the module had helped them understand their strength and weaknesses. Further, twenty-five percent of the student-teachers were uncertain whether the module had helped them become clear about the reasons for learning while twenty percent was uncertain whether the module had helped them practice time management techniques. This might be because the concept taken had a very wide scope and was difficult to be estimated in a short time covering the experimental session. Again, the investigator feels that some of the student-teachers of the Experimental Group needed more assistance in carrying out some of the activities of the module. However, it is noteworthy to mention that none of the student-teachers disagreed with any of the statements regarding the usefulness of different components of the module. On the whole they found the module quite helpful in enhancing their Goal Setting Skill. Thus we can conclude that the module on developing Goal-Setting Skill was quite useful to the student-teachers in enhancing their self-managed learning skills.

4.4.2.2 Opinion of the Experimental Group About the Second Module of the Strategy (Information Location Skill)

To find out the opinion of the student-teachers towards the second module of the strategy viz. Information Location Skill, an opinionnaire consisting of ten statements related to the various components of the module was prepared. The data collected through the opinionnaire was analysed by finding out the percentage of responses of the student-teachers towards each statement. The opinions in the form of percentage of responses have been presented in the table below item wise.

Table 4.9 : Analysis of Opinionnaire (Module 2)

No.	Statements	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
1.	The module on developing information location skill provided us with interesting new information and techniques to find information easily.	50% (10)	45% (9)	5% (1)		
2.	The module was easy to read and easy to understand.	40% (8)	60% (12)			
3.	The activities and exercises given in the module were appropriate.	40% (8)	60% (12)			
4.	The module has helped me become confident about finding and using the various resources, tools and institutions needed for my assignments and projects.	30% (6)	60% (12)	10% (2)		
5.	The module has helped me select the right kind of information for my projects and assignments.	30% (6)	50% (10)	20% (4)		
6.	The module has helped me to use library and other resources effectively.	35% (7)	55% (11)	10% (2)		
7.	The module has helped me to find and use internet materials effectively.	60% (12)	40% (8)			
8.	The module has helped me to know what plagiarism means and how to avoid it.	60% (12)	40% (8)			
9.	The module has helped me to know how to produce a list of references for various information sources.	35% (7)	65% (13)			
10.	The module has helped me in exploring copyright laws related to computer and software use.	30% (6)	65% (7)	5% (1)		

From the above analysis it is clear that the module on developing Information Location Skill has helped the student-teachers become confident about finding and using the various resources, tools and institutions needed for information location. It is also clear that all the students were in favour of most of the statements related to

the usefulness of the module. Most of them agreed or strongly agreed with the various aspects related to the module. However, twenty percent of the student-teachers were uncertain about whether the module had helped them select the right kind of information for their projects. Again, the investigator feels that some of the student-teachers required more time to master this particular aspect of the module. It is however noteworthy to mention that none of the student-teachers totally disagreed with any of the statements related to the effectiveness of the module. Thus it can be concluded that the module on developing Information Location Skill was quite beneficial to the student-teachers for enhancing their self-managed learning skills.

4.4.2.3 **Opinion of the Experimental Group About the Third Module of the Strategy (Information Processing Skill)**

To find out the opinion of the student-teachers towards the third module of the strategy viz. Information Processing Skill, an opinionnaire consisting of ten statements related to the various components of the module was prepared. The data collected through the opinionnnaire was analysed by finding out the percentage of responses of the student-teachers towards each statement. The opinions in the form of percentage of responses have been presented in the table below item wise.

From the opinion expressed by the student-teachers on the various aspects of the third module of the strategy, it can be concluded that most of the student-teachers have a favourable opinion towards the module. However, twenty-five percent of the student-teachers were uncertain about whether the module had helped them understand how the brain deals with information and about the strategies for improving their reading skill. Here, the investigator feels that since the strategy was basically prepared to enhance self-learning skills, less importance was given to explanations of concepts like the working of the brain. Further, the strategies for improving reading skill required lot of practice. The investigator could only provide a basic understanding about them. However, it is noteworthy to mention that none of the student-teachers disagreed with any of the statements regarding the effectiveness of the module. Thus, on the whole, the student-teachers not only found the module readable but also found it useful in understanding the workings of the brain. They

found that the module helped them develop many skills and techniques for improving their information processing skill. Thus we can conclude that the module on developing information processing skill was quite useful to the student-teachers in enhancing their self-managed learning skills.

Table 4.10 : Analysis of Opinionnaire (Module 3)

No.	Statements	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
1.	The module on developing information processing skill provided me with interesting new information and techniques to process information effectively.	50% (10)	50% (10)			
2.	The module was easy to understand.	50% (10)	50% (10)			
3.	The activities and exercises given in the module were appropriate.	25% (5)	70% (14)	5% (1)		
4.	The module has helped me understand how the brain deals with information in a simplified manner using the information processing model.	30% (6)	45% (9)	25% (5)		
5.	The module has helped me become aware of my present reading habits.	30% (6)	60% (12)	10% (2)		
6.	The module has introduced me to a number of strategies for improving my reading skill.	35% (7)	40% (8)	25% (5)		
7.	The KWL technique has helped me to learn a topic in a better way.	25% (5)	70% (14)	5% (1)		
8.	The module has provided useful techn-iques for improving my reading speed.	25% (5)	65% (13)	10% (2)		
9.	The module has helped me identify my present reading speed.	40% (8)	55% (11)	5% (1)		
10.	The module has helped me identify my learning style.	30% (6)	70% (14)			

4.4.2.4 Opinion of the Experimental Group about the fourth module of the strategy (Information Storing Skill)

To find out the opinion of the student-teachers towards the fourth module of the strategy viz. Information storing skill, an opinionnaire consisting of eleven statements related to the various components of the module was prepared. The data collected through the opinionnnaire was analysed by finding out the percentage of responses of the student-teachers towards each statement. The opinions in the form of percentage of responses have been presented in the table below item wise.

Table 4.11 : Analysis of Opinionnaire (Module 4)

No.	Statements	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
1.	The module on developing information storing skill provided me with interesting new information for storing information effectively.	50% (10)	50% (10)			
2.	The module was easy to read.	50% (10)	45% (9)	5% (1)		
3.	The activities given in the module were appropriate.	35% (7)	65% (13)			
4.	The module has helped me become aware of my present note taking and note making skill.	35% (7)	60% (12)	5% (1)		
5.	The module has helped me take clear meaningful classroom notes.	25% (6)	70% (14)	5% (1)		
6.	The module has helped me to use lecture time effectively.	40% (8)	50% (10)	10% (2)		
7.	The module has introduced me to some commonly used abbreviations & symbols that may help me take notes quickly.	55% (11)	45% (9)			
8.	The module has helped me to form abbreviations from just about any word.	40% (8)	55% (11)	5% (1)		
9.	The module has helped me to use the five steps Cornell system for effective notes taking.	30% (6)	50% (10)	20% (4)		
10.	The module has helped me use the mind mapping technique for effective note making and note taking.	15% (3)	85% (17)			
11.	The module has taught me how mind maps may be used in a wide range of situations.	15% (3)	85% (17)			

From the above analysis it is clear that all the student-teachers were in favour of most of the statements related to the effectiveness of the module. Most of them agreed or strongly agreed with the various aspects related to the effectiveness of the module. However, a small percentage of student-teachers were undecided about some of the statements, particularly the statement related to the Cornell system of note-taking. The investigator feels that the actual use of the technique in classroom condition would have made the concept more clear to them. Again it is noteworthy to mention that, none of the student-teachers totally disagreed or disagreed with any of the statements related to the effectiveness of the module. Thus it can be said that the module on developing Information Storing Skill has helped the student-teachers pick up various skills for improving their note-taking and note-making skill. It can thus be concluded that the module on developing Information Storing Skill was quite beneficial in enhancing self-managed learning skills among student-teachers.

4.4.2.5 **Opinion of the Experimental Group about the fifth module of the strategy (Information Retention Skill)**

To find out the opinion of the student-teachers towards the fifth module of the strategy viz. Information Retention Skill, an opinionnaire consisting of twelve statements related to the various components of the module was prepared. The data collected from the twenty student-teachers of the experimental group with the help of the opinionnnaire was analysed by finding out the percentage of responses of the student-teachers in each category. The opinions in the form of percentage of responses have been presented in the table below item wise.

Table 4.12 : Analysis of Opinionnaire (Module 5)

No.	Statements	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
1.	The module on developing information retention skill provided me with interesting new information to retain information	40% (8)	60% (12)			
2.	The module was easy to understand.	45% (9)	55% (11)			
3.	The activities given in the module were appropriate.	30% (6)	60% (12)	10% (2)		
4.	The module has helped me to have a basic awareness of how the brain works.	60% (12)	30% (6)	10% (2)		
5.	The module has helped me to apply techniques to remember essential information when I need	35% (7)	60% (12)	5% (1)		
6.	The section on nutrition and memory improvement was quite useful.	60% (12)	35% (7)	5% (1)		
7.	The section on exercise and memory improvement helped me understand the importance of physical activity for improving our learning.	25% (5)	75% (15)			
8.	The module has introduced me to a number of techniques to improve my information retention skill.	25% (5)	75% (15)			
9.	The module has shown me how to use the principle of chunking to improve my information retention skill.	30% (6)	70% (14)			
10.	The graphs and pictures used in the module helped me to understand the content more clearly.	45% (9)	35% (7)	20% (4)		
11.	The module has helped me understand the difference between retention and learning.	45% (9)	50% (10)	5% (1)		
12.	The module has made me aware of some interesting facts about the new research in the science of brain.	35% (7)	55% (11)	10% (2)		

From the above analysis it is clear that almost all the student-teachers found the module very helpful in improving their information retention skill. Only a small number of student-teachers were uncertain about some of the aspects of the module particularly the statement related to the use of graphs and pictures in the module. In this particular module the investigator had made use of graphs to explain some of the strategies for information retention. The investigator feels that more theoretical knowledge about the concepts would have made the graphs more clear to the learners. However, it is noteworthy to mention that none of the student-teachers disagreed that the module was helpful to them. Thus it is clear that the module on developing Information Retention Skill helped the student-teachers in acquiring skills and techniques to remember essential information when needed. Thus it can be concluded that the module on developing Information Retention Skill was very effective in enhancing the self-managed learning skills of the student-teachers.

4.4.2.6 **Opinion of the Experimental Group about the sixth module of the strategy (INFORMATION RETRIEVAL SKILL)**

To find out the opinion of the student-teachers towards the sixth module of the strategy viz. Information retrieval skill, an opinionnaire consisting of six statements related to the various components of the module was prepared. The data collected from the twenty student-teachers of the experimental group with the help of the opinionnnaire was analysed by finding out the percentage of responses of the student-teachers in each category. The opinions in the form of percentage of responses have been presented in the table below item wise.

Table 4.13 : Analysis of Opinionnaire (Module 6)

No.	Statements	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
1.	The module on developing information retrieval skill provided me with interesting new information and techniques for information retrieval.	35% (7)	65% (13)			
2.	The module was easy to understand.	75% (15)	20% (4)	5% (1)		
3.	The activities given in the module were appropriate.	35% (7)	65% (13)			
4.	The module has helped me practice a number of memory techniques to enhance my ability to learn.	50% (10)	50% (10)			
5.	The techniques given in this module will be of great help while giving exams or participating in debates or seminars.	25% (5)	60% (12)	15% (3)		
6.	The techniques given in this module will make my learning more enjoyable.	55% (11)	40% (8)	5% (1)		

The above analysis shows that most of the student-teachers had a favourable opinion towards the module on developing information retrieval skill. Almost all of them either strongly agreed or agreed to the various statements regarding the effectiveness of the strategy. None of the student-teachers disagreed or strongly disagreed to any of the aspects regarding the usefulness of the strategy. However, a small number of student-teachers were uncertain about some of the aspects related to the module. The module thus helped the student-teachers in learning a number of techniques to retrieve information as and when required from their long-term memory, particularly during their exams or while participating in debates and seminars. Thus, we can conclude that the module on developing Information Retrieval Skill was effective in developing self-managed learning skills among student-teachers.

4.4.2.7 **Opinion of the Experimental Group about the SML strategy as a whole**

To find out the opinion of the student-teachers towards the SML strategy as a whole, an opinionnaire consisting of twenty statements related to the various components of the strategy was prepared. This opinionnaire was prepared in order to find out the overall opinion of the student-teachers towards the various aspects of the strategy like the presentation or lay out of the various modules, the various activities and exercises included in the strategy, the usefulness of various features like 'test yourself', reflections, summary, etc of the strategy and what they felt was the importance of such a strategy. The data collected from the twenty student-teachers of the experimental group with the help of the opinionnnaire was analysed by finding out the percentage of responses of the student-teachers in each category. The opinions in the form of percentage of responses have been presented in the table below item wise.

Table 4.14 : Analysis of Opinionnaire (SML strategy as a whole)

No.	Statements	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
1.	The self-managed learning (SML) strategy provided me with interesting new information for improving my learning skills.	40% (8)	60% (12)			
2.	The SML strategy consisted of number of interesting activities to improve my learning.	50% (10)	50% (10)			
3.	The SML strategy brought about an overall improvement in the manner in which I learn.	40% (8)	60% (12)			
4.	Studying through the SML strategy was quite enjoyable.	40% (8)	60% (12)			
5.	The SML strategy helped me overcome many of my learning difficulties.	45% (9)	55% (11)			
6.	I feel I would have done better in my earlier examinations if I had learnt the various skills provided in the SML strategy.	40% (8)	60% (12)			
7.	The instructions used in the strategy were not proper.				80% (16)	20% (4)

8.	The presentation of the content in the SML strategy was logical.	30% (6)	70% (14)			
9.	The language used in the SML strategy was simple.	30% (6)	70% (14)			
10.	The introductions given at the beginning of each module in the strategy helped me in preparing for learning the contents of the module.	35% (7)	65% (13)			
11.	The facility provided through activities for putting into practice the techniques/methods I learnt were adequate.	25% (5)	75% (15)			
12.	The diagrams, graphs and pictures used in the strategy were quite clear.	20% (4)	70% (14)	10% (2)		
13.	The examples used in the strategy were not proper.			60% (12)	30% (6)	10% (2)
14.	The summary provided at the end of each module helped me in recalling easily things already learnt.	45% (9)	55% (11)			
15.	The section "Test Yourself" given in between the modules helped me in recalling and verifying things already learnt.	50% (10)	50% (10)			
16.	The modules were self explanatory.	65% (13)	35% (7)			
17.	There was no need of the section on reflections.			95% (19)	5% (1)	
18.	Such strategies should be implemented from the school level itself.	35% (7)	65% (13)			
19.	The SML strategy should be made a part of B. Ed curriculum.	35% (7)	55% (11)	10% (2)		
20.	I would like to learn more about self managed learning skills.	55% (11)	45% (9)			

From the analysis of the opinion of the student-teachers towards the strategy as a whole it can be concluded that almost all the student-teachers found the strategy appropriate with respect to the introduction, the content, the activities and exercises, the tests and the summary provided at the end of each module. They also found that the language used in the modules were simple and easy to understand. Not only did

they find the module interesting and useful to improve their study skills but they also found that studying the module was very enjoyable as it was very interactive in nature due to number of activities and exercises provided in each module. However, majority of the student-teachers were not clear about the need of the section on self-reflections given at the end of each module. Apart from this, they were in favour of all the other components of the strategy. In fact, all the student-teachers felt that such strategies should be introduced from school level itself and were in favour of making the strategy a part of the B. Ed curriculum. Again all of them were interested in knowing more about the self-managed learning strategy. This all shows that the strategy was very useful in helping the student-teachers pick up learning to learn skills. Thus we can conclude that the SML strategy as a whole was very useful in enhancing the self-managed learning skills among student-teachers.

4.4.3 Opinion of the Experts About the SML Strategy

The third objective of the study was also to find out the experts opinion about the strategy. To find out the opinion of experts about the SML strategy, unstructured interview method was employed. Four teacher-educators from a teacher training institute and two English language experts served as sample for the study. An unstructured interview using open-ended questions technique was adopted to know the opinion of the experts towards the developed strategy. The responses of the experts were subjected to content analysis and the findings are presented below:

(i) Almost all the experts expressed the opinion that the strategy is a good attempt at developing self-managed learning skills among the learners since it consisted interesting information and activities to improve an individual's learning to learn skills.

(ii) Majority of the experts found that the modules were very interesting and they enjoyed going through the modules.

(iii) The experts also felt that there would be a remarkable improvement in the learning of an individual after going through the modules.

(iv) The experts also expressed the opinion that the language used in the modules was simple and understandable.

(v) Again all the experts felt that the presentation of the content in the strategy was logical.

(vi) The experts felt that the modules were quite self explanatory and did not require the assistance of a teacher.

(vii) However some of the experts felt that the strategy was too lengthy especially the second module for developing information location skills. They felt that since the modules were lengthy the learners might loose motivation to learn.

(viii) Again all the experts were of the view that such strategy should be made a part of the B.Ed. curriculum so that the future teachers are made aware of the skills and techniques that are available to improve an individuals learning. They can become aware of the practical aspects of the theory they learn in their B.Ed. curriculum.

From the above analysis it can be concluded that the experts had a highly favourable opinion towards the self-managed learning strategy. All of them were very positive that the strategy would be very effective in developing self-managed learning skills among any learner not just the student-teachers for whom the strategy was actually prepared.

4.5 DISCUSSION OF THE FINDINGS OF THE STUDY

In the present study an effort was made to develop a strategy for enhancing the self-managed learning skills of student-teachers. The study was carried out with a view to attaining three objectives.

The results presented in the first part of the chapter is concerned with the first objective of the study, which was to identify the various skills, sub-skills and techniques required to manage ones' own learning. While going through the literature related to learning and pedagogy, the researcher could identify a large number of cognitive and meta-cognitive skills that could be used to enhance ones'

learning. Out of these skills, the researcher selected six gross skills that could be taken up for the purpose of research. The six gross skills were selected mainly by taking into consideration the nature of the learners concerned in the present study. The six skills which were identified were Goal Setting Skill, Information Location Skill, Information Processing Skill, Information Storing Skill, Information Retention Skill and Information Retrieval Skill. Further, the skills and techniques that fall under each of the gross skills were identified. The details of the sub-skills and techniques that fall under each of the gross skills, are presented in the first part of this chapter. In the 1998 study conducted by Dixit, the factors which were identified to represent the principal strategies of learning were deep processing, elaborative processing, fact retention, information dependence and success dependence. Similarly, in 2010, study of Joshua reported that components essential to reading include vocabulary development, prior knowledge and background information, inference and prediction, and cognitive and meta-cognitive strategies. The meta-cognitive strategies identified by Abdullateef (2008), include awareness of cognition, planning, monitoring and self-checking, self-appraisal and engagement in risk. While the meta-cognitive strategies in the 2002 study of Kaur included decision making, predicting, logical reasoning, reflective thinking, creative thinking, awareness and planning. The study skills used by Janfeshna and Rapka, in their 2006 study included scanning; skimming through comprehension, critical reading, summarizing, understanding paragraph organization, note-taking and prediction. While the study skills used by on-line learners in the 2010 study conducted by Wang 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. Thus, a large number of cognitive and meta-cognitive skills exist that can be used to develop strategies for enhancing the learning capacity of students of all level. In the present study, a combination of cognitive and meta-cognitive strategies were identified and selected so as to cover all the major steps required to develop self-managed learning skills.

As the second objective of the study which was to develop a strategy for enhancing the self-managed learning skills of the student-teachers for enhancing their learning skills, the strategy consisted of six units in the form of six modules was developed. Each concerned with the development of one of the gross skill identified in the first part of the study. The modules were prepared as self-instructional materials from which the students could learn on their own without the assistance of any instructor. The self-instructional materials included the following components : (a) list of contents, (b) learning objectives, (c) introduction, (d) concepts, (e) activities and exercises, (f) Tests, (g) answer keys, (h) summary, (i) section for reflection and (j) references. The components included in the study have some resemblance to the components identified by Kapfer (1968) and Bedient et al. (1984) in their studies, according to these researchers, these are the requirements for developing learning packages that would allow pupil to learn at the pace and depth best suited to their ability. Further, it was found by Gogoi (2007), Sharma (2008), Joseph (1983) and Bedient et al. (1984) that self-learning method using modules was very useful for learning. There was a positive change in the learners' performance since the introduction of the self-instructional materials. This result is confirmed in the present study.

The third objective of the study was to find out the effectiveness of the SML strategy. In the present study, the effectiveness of the strategy was determined not only in terms of the achievement of the student-teachers through the SML strategy but also in terms of their opinion towards the strategy and experts' opinion about the strategy. Supporting the primary hypothesis of the study, the Mean post-test performance of the Experimental Group was significantly higher than the Mean of Control Group. The performance of the student-teachers of the Experimental Group was significantly better than the Control Group. In fact, seventy-five percent of the student-teachers of the Experimental Group performed at mastery level obtaining a score more than seventy-nine percent. The lowest score obtained by a student-teacher of Experimental Group was fifty-five percent. Thus, it can be concluded that the strategy was very effective in enhancing the self-managed learning skills of the

student-teachers of the Experimental Group. This outstanding performance of the Experimental Group might be due to the fact that they were actively involved in the construction of knowledge due to the large number of activities and exercises included in the modules. This may be also due to the fact that they found the strategy very interesting and useful. It was observed by the investigator that the subjects participating in the study had an intrinsic motivation to perform well, even though they knew that the performance on the achievement test was not calculated into their course grades. They found the strategy interesting and had the motivation to "give it their best." This is further confirmed from the analysis of the opinions of the student-teachers towards the strategy module-wise and as a whole. It was also found that the student-teachers of the Experimental Group performed equally well in all the six units of the strategy. Further, it was noticed that, in the student-teachers' performance in the different skills of the strategy, their performance in the unit related to Information Retention Skill stands first, and Information Location Skill the last. As stated earlier, the results of the opinion of the student-teachers towards the SML strategy also showed that they had a favourable opinion towards the strategy. Moreover they felt that the strategy as a whole was very useful in improving their learning skills. They found the strategy very interesting and felt that such strategies should be implemented from the school level itself. The evolved strategy was further evaluated on the basis of expert's opinion towards the strategy. It was found that the experts also had a highly favourable opinion towards the SML strategy. The findings of the present study is some what similar to the findings of the 1990 study of La Vonne, 2002 study of Kaur, 2007 study of Annemie and 2008 study of Morisano, which all show that cognition and/or meta-cognition can be trained or developed and has some value added in the achievement of the learners.

In addition to what is already discussed, it seems worthwhile to mention that all the student-teachers of the Experimental Group were not ready to hand-over the modules given to them for study during the intervention period. All of them wanted to keep it for their future reference. This again proves that the student-teachers found the strategy very useful for improving their self-managed learning skills.

4.6 MAJOR FINDINGS OF THE STUDY

The major findings of the study have been presented below:

(i) Six skills were identified for developing self-managed learning skills among student-teachers. These were: Goal Setting Skill, Information Location Skill, Information Processing Skill, Information Storing Skill, Information Retention Skill and Information Retrieval Skill.

(ii) The sub-skills and techniques that were identified for developing Goal Setting Skill were: differentiating long-term goal from short-term goal, use of SWOT analysis, use of SMART acronym, identifying ones' life-time goals, identifying ones' learning goals, goal mapping, time-management techniques, preparing activity logs, preparing term calendar, weekly schedule and daily to-do-list.

(iii) The sub-skills and techniques that were identified for developing Information Location Skill were: identification of range of institutions where relevant information could be found, analyzing the topic to be learned, breaking the topic of study into searchable key-words, refining the key-words to obtain relevant results, using library catalogues, using web-resources, evaluating the resources and keeping records.

(iv) The sub-skills and techniques that were identified for developing Information Processing Skill were: using different strategies for reading, using KWL strategy, SQ3R technique, speed reading and identifying ones' learning style.

(v) The sub-skills and techniques that were identified for developing Information Storing Skill were: identifying common abbreviations and symbols used while taking notes, forming new abbreviations while taking and making notes, forming new symbols while taking and making notes, listening skill, Cornell system of note-taking and mind mapping.

(vi) The sub-skills and techniques that were identified for developing Information Retention Skill were: identifying nutrients which nurture brain function, using techniques for improving memory, systematic revision and using the principle of chunking.

(vii) The sub-skills and techniques that were identified for developing Information Retrieval Skill were: forming new acronyms, forming new abbreviations, forming new acronymic sentences, using peg-word and using key-word.

(viii) A modular strategy was developed using the above mention skills, sub-skills and techniques for enhancing the self-managed learning skills of the student-teachers.

(ix) The self- managed learning (SML) strategy was found to be effective in enhancing the learning to learn skills or Self- Managed Learning skills of the student- teachers.

(x) Most of the student- teachers i.e. 75% of them were able to perform at mastery level in the achievement test after the administration of the self-managed learning strategy.

(xi) The student-teachers had a positive opinion about the six skills taken up in the strategy viz. Goal Setting Skill, Information Location Skill, Information Processing Skill, Information Storing Skill, Information Retention Skill and Information Retrieval Skill. Moreover they felt that the strategy as a whole was very useful in improving their learning skills.

(xii) They found the strategy very interesting and felt that such strategies should be implemented from the school level itself.

(xiii) The experts had a highly favourable opinion towards the self-managed learning strategy.

4.7 CONCLUSION

In essence, this study has completed a triad of efforts to identify, develop and find out the effectiveness of a strategy for enhancing Self- Managed Learning skills among student-teachers. Looking into the need of the hour, the investigator feels that there is a need for conducting similar studies using different set of skills and using samples studying at various levels. The same study may also be replicated using different set of sub-skills and techniques for developing the gross skills mentioned in the present study.