Chapter 3

PLAN AND PROCEDURE OF THE STUDY

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3.1 INTRODUCTION

Research methodology is a scientific and systematic way to solve research problems. Methodology directs the whole endeavor – where critical decisions are made and where organization, planning, and directing the whole project takes place. The entire process is a unified effort as well as an appreciation of its component parts. Since the nature of the present study is developmental cum experimental, the methodology of the study has been divided into two parts namely:

PART I : Methodology of Developing the Strategy

PART II : Effectiveness of the Strategy

The main objective of the present study was to develop a strategy for enhancing self-managed learning skills among student-teachers by identifying various skills, sub-skills and techniques required for managing one's own learning. Therefore, the first part of the chapter discusses in detail the procedure which was adopted for developing the strategy. After developing the strategy, the next step was to find out its effectiveness. Therefore, the second part of the chapter deals with the procedure adopted for evaluation of the prepared strategy. It deals with the design of the study, variables selected, population, sample selected, tools used, procedures adopted in conducting the experiment and statistical techniques used for analysis of data.

3.2 PART I : DEVELOPMENT OF THE STRATEGY

A strategy is an organized, sequenced, pre-planned and logically prepared package of instructions, techniques, methods and activities to bring about specific changes in the behaviour of the subjects for whom they are intended. A strategy needs to be evolved before it is tried out and actually implemented. This means identification, selection and sequencing of different components that constituted the strategy and their development and revision. The process, as it involved different phases, was to be carried out step wise.

3.2.1 Steps for Development of the Strategy

The steps followed by the investigator in preparation of the strategy have been presented in what follows:

3.2.1.1 **STEP 1. Conceptualization**: In the first phase of the research, the investigator read critically all the available literature regarding learning theories and pedagogy. Further, the various aspects related to effective learning viz. world knowledge, knowledge of cognitive strategies and meta-cognitive strategies were studied. In order to understand the working of the brain, various models of how information gets into the mind, how it is stored and how it is retrieved as and when required were studied deeply. The information processing theory was chief among them. Further the researcher investigated the various skills, techniques, methods, etc. for developing self-managed learning skills. Based on the above study, the investigator made the following assumptions:

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

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

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

The above stated assumptions were the guidelines based on which the entire strategy was developed.

3.2.1.2 **STEP 2. Determination of Requirements:** The present study had a target population of 21-25 age group of college going students, a group marked by the characteristics of independence and self-reliance. Naturally, such a group would take pride in doing things independently. Even learning is no exception to this. Moreover, the aim of the present study was to develop self-managed learning skills among student-teachers. Thus looking into the

nature of the group of learners and their psychology the following points were kept in mind as requirement of the study:

Requirement of the study

(i) The techniques involving self-learning were deemed to be more suitable than those that needed constant guidance and persuasion.

(ii) Exercises and activities, which involved moderate challenge taking, would provide the pupils with ample scope for putting into practice the concepts and structures already learnt.

(iii) Also since the objective of the study was to develop self-learning skills, it was necessary to include a lot of activities or skill based exercises in the strategy.

(iv) The concept and structures already learnt by the pupils or the entry level behaviour of the learners was kept in mind.

(v) Apart from the considerations discussed above, the feasibility of adopting the evolved strategy also was taken care of.

(vi) The availability of the material needed for preparation of the strategy, and availability of time were also taken into consideration.

(vii) Added to these were considerations on administrative support, academic freedom, heterogeneity of pupils, instructional obligations, etc. also helped in their own way to decide the feasibility aspect of the techniques to be selected.

From the conceptualization phase, the researcher also identified the principles based on which the strategy should be evolved. Since the strategy was prepared in modular form the following principles were kept in mind while preparing the strategy:

Principles based on which the study was developed

(a) ***Self-contained***: Modules are self-contained which present sufficient content to represent a unit. The writer includes adequate, relevant and rich content so that the students can learn without any additional support. These are self-contained learning activity packages.

(b) ***Interactive in nature***: Modules present learning activities to ensure participation of the learner in the learning process. Therefore, the content is presented in a simple language, learning activities are properly planned and self-evaluation exercises are given.

(c) ***It is structured in nature***: The content of the modules is structured in a systematic, sequential order to achieve the pre-determined objectives. The emphasis is on self-instruction and the material favours active involvement of the learner.

(d) ***Self-assessment***: Modules provide learning activities which are appropriate to the learners' level of development and achievement, where learning is done by the learner on his own and he gets many opportunities for self-assessment through "check your progress questions". Thus he gets immediate reinforcement which further facilitates learning.

3.2.1.3 **STEP 3. Identification of the skills and sub-skills and techniques required for SML :** From the conceptualization phase, the researcher became clear about how learning takes place and what the components of effective learning are. Further, based on the information about how the brain processes information and the researcher's own experience and experience of teaching in a teacher-training institution, the gross skills and sub-skills and techniques required for SML were identified. These were finalized with the help of the Guide and three experts in the field of teacher-education.

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

(i) Goal Setting Skill

(ii) Information Location Skill

(iii) Information Processing Skill

(iv) Information Storing Skill

(v) Information Retention Skill

(vi) 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. Various components necessary for the development of self-managed learning skills among student-teachers were identified and selected on the basis of researcher's own experience and study of literature related to learning and help from experts in the field of education. The sub-skills and techniques identified during the study of literature were then categorized into the major or gross skills under which they fall. The details of the sub-skills and techniques required for SML are presented in detail in chapter 4 (Part – I).

3.2.1.4 **STEP 4. Content Analysis :** The above mentioned skills by way of units, viz. Goal Setting Skill, Information Location Skill, Information Processing Skill, Information Storing Skill, Information Retention Skill and Information Retrieval Skill, in turn, were broken down into major concepts and sub-concepts or skills and sub-skills and elaborated into activity based modules. The specific sequential outline of the content matter within each unit/module is presented in detail in Chapter 4 (Part-II).

3.2.1.5 **STEP 5. Determination of terminal behaviour :** Before developing a strategy it is important to have a total picture of the general objectives for which the strategy has to be developed. Therefore, the general objectives based on which the strategy should be developed were determined first. The general objectives of the self-managed learning strategy were as follows:

(i) To develop goal setting skill among student-teachers

(ii) To develop information location skill among student-teachers

(iii) To develop information processing skill among student-teachers

(iv) To develop information storing skill among student-teachers

(v) To develop information retention skill among student-teachers

(vi) To develop information retrieval skill among student-teachers

Unit-wise expected terminal behaviour : After determination of general objectives, in accordance with the detailed analysis of the content given in the flow charts, terminal behaviours were specified in behavioural terms for the complete strategy and laid down unit wise in what follows:

Unit 1: Goal Setting Skill

(i) Student-teachers will be able to differentiate long term goals from short term goals.

(ii) Student-teachers will be able to identify their strengths and weaknesses using SWOT analysis.

(iii) Student-teachers will be able to learn the steps in SMART goal setting.

(iv) Student-teachers will be able to identify their lifetime goals.

(v) Student-teachers will be able to identify their learning goals.

(vi) Student-teachers will be able to use the technique of goal mapping.

(vii) Student-teachers will be able to find out how they really spend their time.

(viii) Student-teachers will be able to plan and manage their study time with the help of a Semester Calendar, Weekly Schedule, and Daily To Do List.

Unit 2: Information Location Skill

(i) Student-teachers will be able to use the different types of tools and resources available for locating information.

(ii) Student-teachers will be able to identify the range of institutions and collections open to them for locating information.

(iii) Student-teachers will be able to analyse their topic of study and break them down into searchable keywords.

(iv) Student-teachers will be able to refine the keywords in order to obtain right results.

(v) Student-teachers will be able to search for resources using the library catalogue.

(vi) Student-teachers will be able to use the various web resources.

(vii) Student-teachers will be able to state copyright laws related to the use of web resources.

(viii) Student-teachers will be able to evaluate the various resources used for the purpose of learning.

(ix) Student-teachers will be able to keep appropriate records of the resources used for learning.

Unit 3: Information Processing Skill

(i) Student-teachers will be able to explain how the brain processes information.

(ii) Student-teachers will be able to use different strategies to process information while they read.

(iii) Student-teachers will be able to use the KWL strategy to improve their reading comprehension.

(iv) Student-teachers will be able to use the SQ3R technique.

(v) Student-teachers will be able to speed read a text.

(vi) Student-teachers will be able to learn in a way that suits them by knowing the various learning styles.

Unit 4: Information Storing Skill

(i) Student-teachers will be able to identify ways of improving their note taking skills while listening to lectures.

(ii) Student-teachers will be able to identify a number of common abbreviations/symbols that they may use while taking down notes.

(iii) Student-teachers will be able to use new abbreviations while taking notes.

(iv) Student-teachers will be able to form new abbreviations while taking notes.

(v) Student-teachers will be able to improve their listening skill.

(vi) Student-teachers will be able to use the Cornell system of notes taking.

(vii) Student-teachers will be able to use the mind-mapping technique for notes taking and notes making.

Unit 5: Information Retention Skill

(i) Student-teachers will be able to explain the structure of the human brain.

(ii) Student-teachers will be able to state the specializations of the left brain and the right brain.

(iii) Student-teachers will be able to name certain nutrients which nurture and stimulate brain function.

(iv) Student-teachers will be able to state the importance of exercise for improving the efficiency of the brain.

(v) Student-teachers will be able to use the techniques for improving their memory.

(vi) Student-teachers will be able to use the technique of systematic revision for learning.

(vii) Student-teachers will be able to use the principle of chunking to enhance their information retention skill.

Unit 6: Information Retrieval Skill

(i) Student-teachers will be able to form acronyms to improve their information retrieval skill.

(ii) Student-teachers will be able to form abbreviations to improve their information retrieval skill.

(iii) Student-teachers will be able to form acronymic sentences to improve their information retrieval skill.

(iv) Student-teachers will be able to form peg words to improve their information retrieval skill.

(v) Student-teachers will be able to form keywords to improve their information retrieval skill.

Finally, the learning material was selected and prepared looking into the suitability of the objectives and components.

3.2.1.6 **STEP 6. Development of Strategy**: Keeping in view the various requirements stated in the preceding paragraphs and the terminal behaviour to be achieved, a strategy was evolved by the investigator. It was decided that the strategy would consist of six units, each representing a major step in the process of SML. The units of the strategy are presented below:

UNIT 1: Goal Setting Skill

UNIT 2: Information Location Skill

UNIT 3: Information Processing Skill

UNIT 4: Information Storing Skill

UNIT 5: Information Retention Skill

UNIT 6: Information Retrieval Skill

In the present study, self-instructional materials in the form of modules have been used for developing self-managed learning skills among student-teachers. Self-instructional materials are based on the principles of learning in general and self-learning in particular. Self-instructional material enables learners to learn independently, unaided and at their own pace. It has its own structure. It is theme based and self-contained. It includes objectives, learning exercises and in text assessment for offering continuous feedback. There is a built-in flexibility in the text which promotes interaction. Thus, self-instructional materials or modules consist of self-contained learning activity packages which promote self-learning, self-evaluation and self-enhancement through continuous feedback. It thus effectively helps in achieving the predetermined objectives. Envisaging all the aspects so far discussed, when the instructional components are selected and evolved, they would have the following attributes: (1) self-learning, (ii) activities, and (iii) moderate challenge taking. It is these attributes that stood as a beacon to guide the selection of the various instructional components that constituted the strategy. Accordingly each module/unit of the strategy is made of the following components:

(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 each content in every module, 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 situation, 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.

3.2.1.7 **STEP 7. Expert's opinion and views:** The prepared material was reviewed (in the light of the objectives of the study) by experts in the field of education 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, certain changes were made in the material by adding some new items and rejecting unnecessary items. Thus, the whole package was modified, revised and organized properly.

3.2.1.8 **STEP 8. Try out:** Having improved the first draft of the self-managed learning strategy, it was tested on five student-teachers (different from the

sample). This was done to identify and remove the difficulties that would possibly be faced by the sample while studying through the modules. The student-teachers were observed and asked about the problems they faced while going through the modules and while carrying out the various activities and exercises provided therein. In the light of the problems experienced by the student- teachers, necessary corrections were made in the strategy.

3.2.1.9 **STEP 9. Preparation of the final draft:** The modules were edited and organized keeping in view all the observations made by the experts and the student-teachers and the insight obtained by conducting the pilot study.

3.3 PART – II EFFECTIVENESS OF THE STRATEGY

3.3.1 Research Design

The present study was developmental cum experimental in nature. The investigator developed the SML strategy and adopted the pre-test-post-test equivalent group design to find the effectiveness of the strategy. The design of the experiment was as follows:

Table 3.1 : Design of the Experiment

Group	Pre-Test	Experimental Treatment	Post-Test
Experimental Group	√	√	√
Control Group	√	X	√

Note: "√" indicates the presence and "X" indicates absence of a particular treatment.

Both the groups; Experimental group (EG) and Control group (CG) were first given pre-test and then the experiment was conducted with the EG. The CG was not given any experimental treatment. The difference was observed at the end of the treatment period in the particular factor under study. The difference between the performance of EG and CG is expected to be due to exposure to the experimental treatment. At the expiry of the experimental treatment period, both the groups were given post-test. Finally, suitable statistical techniques were used to compare the gains of difference of EG and CG and findings and conclusions were drawn and reported.

3.3.2 Variables of the Study

A concept which can take on different quantitative values is called a variable. Variables are the condition or characteristics that the experimenter manipulates, controls or observes.

Independent Variable

In the present study the independent variable is the experimental treatment i.e. the Self-Managed Learning strategy which was developed by the investigator.

Dependent Variable

In the present study, the dependent variable is the achievement of the student-teachers in the SML skills which is measured with the help of an achievement test.

The influencing variables during the experimental treatment were controlled in the following manner:

Intervening Variable

The intervening variables in the present study include the following:

(i) ***Anxiety***: The factor of anxiety in the student subjects was controlled by telling them that even if their performance was poor during the said experiment, it would not in any way negatively affect their final examination result. They were also told that their responses would be recorded and used only for research purpose.

(ii) ***Fatigue***: The factor of fatigue was controlled by giving the experimental treatment to the students in the morning hours before their regular classes began. Since the treatment consisted of studying from self instructional modules the students were free to study from them as and when the time was available to them. The pre and post-tests were also administered before the commencement of the regular classes.

(iii) ***Motivation***: The students were told that they would be learning some interesting and useful things that would help them improve their learning in all the subject areas. They were told that they would be acquiring skills

which would not only help them in their learning but also would help them in teaching as these skills could be in turn transferred to their students during classroom teaching.

Extraneous Variables

The extraneous variables in the present study include the following:

(i) ***Teacher Competence and Enthusiasm***: The researcher herself who has an M.Sc. (Chemistry), B.Ed., M.Ed. and has experience of teaching in B.Ed. college had evolved the strategy and then used it with the Experimental Group learners for the study.

(ii) ***Age***: The student-teachers selected for the study were almost of the same age (23-25 years old)

(iii) ***Academic Ability***: The sample was selected by way of the 'Table of Random Numbers'. Thus, there was no discrimination on the basis of their academic rank and division.

(iv) ***Observer Distraction***: There was no observer during the conduct of the experimental treatment in order to avoid observer distraction.

(v) ***Systematic Bias/Sampling Error***: A sample of forty students was selected by way of the 'Table of Random Numbers'. Through Lottery Method, two groups EG and CG were formed.

Although it is practically impossible to eliminate all extraneous and intervening variables, particularly in the classroom based research, an honest attempt was made by the researcher to cognize the extraneous and intervening variables and taking care while interpreting results.

3.3.3 Population

The population of the present study comprised of all the student-teachers of the one hundred and sixty three regular teacher-training colleges of Kerala. (www.ncte.org)

3.3.4 Sample Selected for the Study

Out of the hundred and sixty three B.Ed colleges of Kerala, one co-educational government aided B.Ed college from Tiruvalla district in Kerala viz. Titus II Teachers College was selected for the study. The college was selected on the basis of convenience of the investigator. Out of the hundred and fifty student-teachers of the college, forty were selected by using the 'Table of Random Numbers'. For this purpose, the list of student-teachers was collected from the college office and every third student in the list was selected for the study. The sample thus selected was further divided in to two groups: Experimental Group (EG) and Control Group (CG). For this purpose, the sample selected from the group were asked to pick up a chit of paper which either contained the alphabet 'A' or 'B". Those student-teachers who picked up chit consisting of alphabet 'A' were assigned to EG and those who picked up the chit consisting of alphabet 'B' were assigned to CG. Each group thus consisted of twenty student-teachers. Their division into two groups is presented as follows:

Table 3.2 : Details of Group

Sr. No.	Groups	No. of Students
1.	Experimental Group (EG)	20
2.	Control Group (CG)	20
	Total	40

The sample thus selected consisted of thirty-six girls and four boys of the age group 21 to 25 years. Out of the forty student-teachers, twenty-eight were post-graduates while twelve were graduates. The sample consisted of student-teachers belonging to both arts and science stream.

3.3.5 Materials and Tools Used for the Study

For the purpose of the present study the investigator used the following materials and tools:

1. The Self-managed learning strategy, in the form of six self-instructional modules, each covering a different aspect of learning (Volume II).
2. Pre-test based on the self-managed learning strategy (Appendix - I)
3. Post-test based on the self-managed learning strategy (Appendix - II)
4. An opinionnaire for each module (Appendix – VI, VII, VIII, IX, X, XI)
5. An opinionnaire for the entire strategy (Appendix - XII)

3.3.6 Preparation of Tools for the Study

The details regarding the preparation of the SML strategy is presented in the first part of this chapter. In the following sections, details regarding the preparation of the achievement test which consisted of a pre-test and post-test and the opinionnaire are presented.

3.3.6.1 **Preparation of achievement tests**

The achievement test consisted of a pre-test and a post-test. The pre-test and the post-test were equivalent in nature but not the same. Both the tests were prepared by following the Blue-print presented in appendix XIII. Thus, the tests were equivalent with respect to content, objectives, marks assigned and difficulty level.

The pre-test and the post-test used for the present study were constructed by the investigator by following the phases mentioned below:

Phase One: Design of the Test

Preparation of the table of specification is the most important task in the preparation of the achievement test. The objectives, content, form of questions and difficulty levels of items are the most important factors to be considered in the design. The details regarding design of the test are given below:

- Weightage to objectives
- Weightage to content
- Weightage to form of questions
- Weightage to difficulty level

Weightage to Objectives

Since the aim of the strategy was to develop SML skills among student-teachers, the skill based objectives were given more importance. The weightage given to the different objectives is shown in the table given below:

Table 3.3 : Weightage to Objectives

Sr. No	Objectives	Number of questions	Total Marks	Percentage (%)
1.	Knowledge	21	10.5	10.5
2.	Understanding	12	06.0	6.0
3.	Application	07	21.5	21.5
4.	Skill	10	62.0	62.0
	TOTAL	**50**	**100**	**100**

Weightage to Content

The SML strategy consisted of six units in the form of six modules. Equal weightage was given to each unit. The detailed description of weightage given to content is given in the table that follows:

Table 3.4 : Weightage to Content

Sr.No	Content	Number of questions	Total Marks	Percentage
1.	Goal Setting Skill	8	20.5	20.5
2.	Information Location Skill	8	12.5	12.5
3.	Information Processing Skill	9	13.5	13.5
4.	Information Storing Skill	9	20	20
5.	Information Retention Skill	9	15.5	15.5
6.	Information Retrieval Skill	7	18	18
	TOTAL	**50**	**100**	**100**

Weightage to form of questions

Mainly three different forms of questions were used in the preparation of the achievement test. They were objective type, short answer type and descriptive type of questions. The weightage given to each form of question is shown in the table below:

Table 3.5 : Weightage to form of Questions

Sr. no	Form of question	Number of questions	Total Marks	Percentage
1.	Objective type	35	18	18
2.	Short answer type	11	47	47
3.	Descriptive type	04	35	35
	TOTAL	**50**	**100**	**100**

Weightage to Difficulty Level

Other than the factors mentioned in the blue-print, the questions were further divided into three groups according to their difficulty level viz. easy, average and difficult. The difficulty level of the items of the test are shown in the table given below:

Table 3.6 : Weightage to Difficulty Level

Sr. no	Level of difficulty	Number of questions	Total Marks	Percentage
1.	Easy	23	15.5	15.5
2.	Average	20	53.5	53.5
3.	Difficult	07	31	31
	TOTAL	**50**	**100**	**100**

Phase Two: Writing of Items

Various topics from the prepared strategy were selected by the investigator to prepare the achievement test. Since the strategy consisted of six units in the form of six modules, appropriate weightage was given to each unit. Since the main objective

of the experiment was to develop SML skills among student-teachers, skill objectives were given more prominence. The initial test items consisted of 75 questions which included mainly objective type questions.

Phase Three: Preparation of Initial Draft

The initial draft consisted of 75 questions for pre-test and 75 questions for post test. Mostly objective type questions were only included in the initial draft.

Phase Four: Evaluation of the Initial Draft

The initial draft of the achievement test was submitted to the supervisor of the investigator for evaluation. The supervisor suggested the following modifications:

- To avoid repetition of the items
- To include items from each content area of the strategy
- To reconstruct certain items which were vague

Phase Five: Preparation of the Second Draft

Based on the suggestions given by the supervisor, the second draft of the tool was prepared. Items from each content area were selected and items which were repeated were deleted.

Phase Six: Validation of the Tool

The tools along with the answer key were submitted to a panel of experts. The panel consisted of five experts, four belonging to the field of teacher education and one an expert in English language. The experts thus selected were those who had more than ten years experience in the field of education and had expertise in developing research tools. The panel of experts was requested to go through the tools and give suggestions for the improvement of the same keeping in view the nature and objectives of the study. After going through the tools the panel of experts gave the following suggestions for the improvement of the research tools:

- Addition of more application level questions
- To reduce the number of objective type questions
- To include activity based questions to check the level of skill development
- To reduce the number of questions

Further based on the pilot study the following changes were made in the achievement test:

- Language used in preparation of certain questions were simplified
- Time required for the completion of the test was finalized
- Space given for answering the questions were adjusted

Phase Seven: Revised Third Draft

The third draft of the achievement test was prepared based on the corrections and suggestions made by the panel of experts. Further improvement was made in the achievement test from the insight obtained by carrying out the pilot study. The third revised draft of the achievement test consisted of 50 items. Objective and subjective type questions were included. Stress was given on including more skill based questions.

Phase Eight: Preparation of Final Draft

The third revised draft was again submitted to the panel of experts and after their approval the achievement test was finalized. The final draft of the achievement test is attached in appendix - I and II

3.3.6.1.1 Scoring and Interpretation

Both the pre-test and post-test consisted of 50 questions each, which included both objective and subjective type questions. More weightage was given to skill based questions as the strategy was prepared for developing skills among the learners. Scoring key was prepared according to the difficulty level and time taken to complete each question. The distribution of marks for both the tests was shown to the experts. Their suggestions were incorporated and the distribution of marks was improved upon and given a final shape. The scoring scheme of both the tests has been given in the appendix- III and IV. The maximum marks awarded for the test was 100. For interpreting the scores, the investigator calculated mean, S.D. and "t" test.

3.3.6.2 **Preparation of Opinionnaire**

In order to find out the opinion of the student-teachers towards the SML strategy, seven different opinionnaires were prepared by the investigator. There was one opinionnaire for each module of the strategy and one opinionnaire was prepared to find out the opinion regarding the entire strategy. The six opinionnaires prepared for each module separately contained items which sought the opinion of the student-teachers towards the various components of that particular module. The items were based on the objectives the components were intended to attain in the strategy. The validation of the opinionnaire was done by the same experts who had validated the achievement test. Later a sample study was carried out and based on the suggestions of the experts and the feedback received from the sample, modifications were made in the opinionnaire. Copies of the opinionnaires are given in appendix - VI, VII, VIII, IX, X, XI, XII.

The Likert Method of Summated Ratings was used to elicit the opinion of the student-teachers towards the strategy. The student-teachers were supposed to give their opinion on a five-point scale: strongly agree, agree, undecided, disagree and strongly disagree. They were supposed to give their opinion regarding each statement in anyone category by choosing from the five point scale.

3.3.7 Procedure of Experiment

The procedure of the experiment included the following steps:

3.3.7.1 Preparation of the Group of Learners for the Experiment:

As discussed earlier the sample for the study consisted of forty student-teachers of a co-educational government aided B. Ed college from Tiruvalla district in Kerala. Out of the hundred and fifty student-teachers of the college, forty were selected by using the 'Table of Random Numbers'. For this purpose, the list of student-teachers was collected from the college office and every third student in the list was selected for the study. The sample thus selected was further divided in to two groups: Experimental Group (EG) and Control Group (CG). For this purpose, the sample

selected from the group were asked to pick up a chit of paper which either contained the alphabet 'A' or 'B". Those student-teachers who picked up chit consisting of alphabet 'A' were assigned to EG and those who picked up the chit consisting of alphabet 'B' were assigned to CG. Thus each group consisted of twenty student-teachers.

3.3.7.2 Administration of Pre-test

The investigator conducted a pre-test to measure the entry level behaviour of the sample with respect to the prepared strategy. The test was based on the six modules prepared by the investigator to develop SML skills among student-teachers. The test consisted of both objective and subjective type questions.

After giving a brief idea regarding the experiment and the role of the student-teachers therein, the pre-test was administered. The time allotted for completion of the test was one hour and total marks of the test was 100. The student-teachers were requested not to hesitate in responding to the test as the test was not going to affect their examination results in any way. After the completion of the test the student-teachers of EG were asked to come for the experimental treatment whereas the students of CG were asked to reappear for the post-test on the scheduled time and day. This was done in order to find out whether they could do something to improve their test scores as well as weakness on their own.

3.3.7.3 Establishing Equivalence of EG and CG

In order to equate the experimental 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 level. The details of the analysis are summarized in the following table.

Table 3.7 : Test of Significance of Difference Between Means of Pre-Test Scores of Experimental Group and Control Group

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)

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 2.704 to be significant at 0.01 level of significance for 38 degrees of freedom. This proves that both the groups were equivalent at the pre-test level.

3.3.7.4 Administration of the Experimental Treatment

Since the nature of the study was to develop self-managed learning skills among student-teachers, every student-teacher of the EG received a copy of the modules and a manual. The self-managed learning strategy consisted of six modules and one manual which gave a short but clear explanation about how to use the modules. The most important purpose of the strategy was to encourage student-teachers to develop skills to learn on their own and to make them aware of different techniques and method to develop their learning; therefore the process adopted in the experiment was that of self-study. After the administration of the pre-test, each student-teacher of the experimental group was given a copy of the first module. A brief explanation regarding the contents of the module was given by the investigator. The student-teachers were asked to go through the modules and ask any question that arouse in their minds. Then they were given four days to study and use the modules. After four days, a one hour study session was organized in which the student-teachers clarified doubts if any. Then an opinionnaire related to that particular module was handed over to each of the participant. After completing the opinionnaire, a short test was taken in order to test their understanding. In this way, the six modules were administered along with the opinionnaire. After completion of each module there

was a study session of one hour and distribution of modules and collection of data regarding the reaction of the student-teachers towards the modules. After completion of six modules, the student-teachers were given six days to go through the entire strategy. Then their opinion regarding the entire strategy was collected with the help of the opinionnaire and finally the post- test was administered.

3.3.7.5 Administration of Post-test

The post-test was administered to both the groups i.e. EG and CG after the completion of the experiment in order to find out whether the SML strategy was effective in developing learning to learn skills among student-teachers. Like the pre-test the post-test also consisted of both objective and subjective type questions. The maximum marks allotted for the post-test was 100.

3.3.8 Data Analysis

The data of the present study consisted of the pre-test/post-test scores, the opinion of the student-teachers towards the strategy and the opinion of the experts towards the strategy. The opinions of the student-teachers towards the strategy were analyzed by finding out the percentage responses towards each individual statement of the opinionnaires while the opinion of the experts towards the strategy was analyzed by content analysis method. To study the effectiveness of the evolved Self-managed learning strategy, the pre-test and post-test scores of the experimental and control groups were subjected to the following statistical techniques:

(i) **Mean**

$Mean = \sum fx / N$

$\sum$ = sum of

f = frequency of the class

x = mid-value of the class

N = sum of the frequencies

(ii) **Standard Deviation (S.D.) for small sample**

$\sigma = i \sqrt{\sum fx'^2 / N - (\sum fx' / N)^2}$

i = class interval

f = frequency of the class

x' = deviation of the mid-points of the different steps measured from the assumed mean in units of class interval.

N = sum of the frequencies

(iii) **'t ' test**

$$t = X_1 - X_2 / \sqrt{(N_1 - 1) S_1^2 + (N_2 - 1) S_2^2 / N_1 + N_2 - 2 . (1/N_1 + 1/N_2)}$$

X_1, X_2 = Mean of the experimental and control group

S_1, S_2 = Standard deviation of the experimental and control group

N_1, N_2 = Total number of students in the experimental and control group

3.4 CONCLUSION

To sum up, this chapter has discussed the procedures adopted for the preparation of the instructional material and the methods used for validation of the self-managed learning strategy. An attempt has been made in this chapter to discuss in detail the sample selection, variables in the study, research methodology, preparation of instructional materials, procedure of experiment and the statistical techniques used for the analysis and interpretation of data. This chapter also dealt with the steps taken for constructing the research tools, namely, the opinionnaire, the pre and post-tests. The scoring scheme and the administration of the tools have also been discussed in this chapter.

The following chapter discusses the analysis and interpretation of the data.