Chapter IV

**Methodology**

*Introduction*
*Method adopted*
*Variables*
*Tools and techniques used*
*Population and sample for the study*
*Procedure for data collection*
*Experiment conducted*
*Statistical method adopted*
Chapter IV

METHODOLOGY

4.0 INTRODUCTION

The methodology of the study endears an overview of all the considerations of the research works that is to be executed and at this stage the crucial decisions for the accomplishment of objectives of the study are taken.

According to Kothari C.R (1996) Research Methodology is a way to systematically solve the research problem. It is a science, that deals with the various steps that are generally adopted by a researcher in studying his research problem along with the logic behind them. The truth is that, successful completion of a research work without proper planning becomes not only difficult, but will nigh impossible. The planning includes the measures are to be adopted for collecting the relevant data, the sample to be taken, what controls are to be employed, and which would be the pertinent data that would be analysed. The details regarding the method adopted, tools and techniques used, sample selected, procedure adopted and statistical techniques employed are given in this chapter.
4.1 METHOD ADOPTED

Survey and experimental methods are used for collecting relevant data for the study. In order to measure perception of student teachers regarding the use of self-learning materials, survey method was adopted. Survey research is a method for collecting and analysing data obtained from large number of respondents representing a specific population. "Survey is concerned with conditions or relationship that exist, practices that prevails, beliefs and point of view or attitude that are held, process that are going on, effects that are being felt-or trend that are developing" (Best and Khan 1999). The various dimensions included under this part are;

1. Awareness of student teachers towards the use of self-learning materials.

2. Opinion of student teachers towards the use of self-learning materials.

3. Availability and extend of use of self-learning materials by student teachers in teacher training institutions.

4. Training provided, problems faced and suggestions for the effective use of self-learning materials.

For assessing the performance of student teachers regarding the use of self-learning materials, experimental method was found suitable. "Experimental method is one where the researcher manipulates some variables and examines their impact under possible controlled conditions" (Singh 1997).
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The design employed for the experimental part is pre-test, post-test parallel group design. The self-learning materials prepared for assessing the performance of student teachers are computer assisted instructional materials, instructional modules and multimedia packages.

4.2 VARIABLES IN THE EXPERIMENT

"Variables are the characteristics or conditions that are manipulated, controlled or observed by the experimenter" (Singh 1997). The variables in the experiment are:

4.2.1 Independent variables

"Independent variable is the one about which the experimenter makes a prediction" (Sax 1979). In the present study the independent variables are the instructional strategies adopted.

4.2.2 Dependent variables

The variable in which the student is asked to respond is called as dependent variable (Sax 1979). The dependent variable considered for the present study is the achievement of the student teachers with respect to the instructional strategy adopted.

4.2.3 Extraneous variables

The extraneous variables are those that operate in the experimental situation in addition to the independent variables (Singh 1997). In the present
study the basic qualification, socio economic status and subject of the student teachers and nature of the teacher education institution are considered as the extraneous variables affecting the experiment.

4.3 TOOLS AND TECHNIQUES USED

Keeping in view of the objectives of the study, the following tools and techniques were used.

4.3.1 Content Analysis
4.3.2 Awareness test
4.3.3 Opinionnaire
4.3.4 Questionnaire
4.3.5 Prepared self-learning materials
4.3.6 Achievement test

The details regarding the preparation of tools and techniques employed for the present study are outlined below.

4.3.1 Content Analysis

Content analysis encompasses a group of techniques, concerned with the analysis of records already in existence. As a part of the analysis of the B.Ed. curriculum, the investigator analysed the B.Ed. syllabus in general and for the various optional papers in particular to find out the level of self-learning materials included in it.

The details of content analysis done are presented in a later Chapter (Vide Chapter V)
4.3.2 Awareness test

In the design of this research it was planned to study and measure the awareness of secondary level student teachers regarding the use of self-learning materials.

The student teacher’s awareness on self-learning materials, facilities, devices and equipments related to self-learning was measured by a five point awareness test. It was assumed that the student teachers are capable of self-judging their awareness on self-learning materials, facilities, devices and equipments related to self-learning.

As a first step, for preparing the items in the awareness test the researcher made an extensive and comprehensive survey of literature which included books, journals, periodicals, research abstracts, encyclopedias and many other sources. Discussions and consultations with educational leaders were held by the researcher on self-learning materials, individualized instructional strategies and on innovative trends in modern education. Visits were made to progressive educational institutions in India like NCERT, IGNOU, Indore University and Jawaharlal Nehru University, New Delhi.

The various categories under which the items in the awareness test included are,

Awareness with respect to:

- Self-learning materials,
- Concepts and theories associated with self-learning materials
- Facilities associated with self-learning
- Software materials used for self-learning purpose
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- Projection devices and equipments used for self-learning purpose, and
- Non projection devices and equipments used for self-learning purpose.

As a second step, experts in the field of educational technology were consulted for judging the relevance and significance of the items related to self-learning materials included in the test. These consultations were very illuminating and they helped in arranging the items under various categories. Thus 60 items were prepared and arranged under for categories.

In the awareness test, a five point scale was adopted for checking the awareness of the student teachers regarding the use of self-learning materials.

The five point scale is as follows:

- Poor awareness - 0
- Low awareness - 1
- Average awareness - 2
- Good awareness - 3
- Very good awareness - 4

As a third step the preliminary administration of the test was conducted for 185 student teachers and is shown below.

Table 1

Sample taken for experimental try-out

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Name of the College</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UCTE- Kudamaloor</td>
<td>60</td>
</tr>
<tr>
<td>2</td>
<td>SAM Training College, Poothotta</td>
<td>60</td>
</tr>
<tr>
<td>3</td>
<td>Avila College of Teacher Education, Edakochi</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>185</td>
</tr>
</tbody>
</table>
The student teachers were required to tick (✓) the appropriate column for each item. The awareness score could be obtained by merely adding all the scores corresponding to the ticked columns in the awareness test. The maximum obtainable score was $60 \times 4 = 240$ only for each student teacher. On the basis of the preliminary administration of the test, 10 items were omitted from the draft test. The final test consisted 50 items.

4.3.2.1 Validity and reliability

The psychometric properties such as validity and reliability were established by using the method suggested by Anastasi (1968).

4.3.2.2 Validity

As described earlier the awareness test was developed in three steps. In the first step a list of items were prepared by reviewing literature, consulting with leaders in education and by visiting progressive institutions in India. In the second step experts in the field of educational technology were consulted for judging the relevance and significance of the items. A few modifications were suggested by the experts and were incorporated into the tool. In the third step the experimental try-out was conducted and the test was finalised.

4.3.2.3 Reliability

The reliability of the tool for checking the awareness of student teachers on self-learning materials were established by using split-half method
and after the application of the Spearman-Brown formula, the reliability coefficient was found to be 0.96. The tests used for the experimental try-out and final study are given in the appendix as 2A and 2B.

4.3.3 Opinionnaire

In order to study and measure the opinion of student teachers towards the use of self-learning materials an opinionnaire was prepared and its details are given below.

4.3.3.1 Selection of the items

By going through the literature on self-learning materials, the investigator designed 70 statements containing positive and negative statements for the construction of the opinionnaire.

For screening the statements the criteria suggested by Edward (1957), Kilpatrick (1948) and Likert (1932) were applied.

The opinionnaire was typed out and presented to a group of experts in the field for their critical comments.

In the light of criticism and comments of the experts some statements were modified and about 25 statements were deleted. Thus the opinionnaire consists of 45 statements and are classified under the following five categories.
Table 2

Classification of statements in the opinionnaire (Draft form)

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Category</th>
<th>No. of statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General characteristics of self-learning</td>
<td>1-12 (12)</td>
</tr>
<tr>
<td></td>
<td>materials</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Preparation and implementation of</td>
<td>13-18 (6)</td>
</tr>
<tr>
<td></td>
<td>self-learning materials</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Self-learning materials and its impact on</td>
<td>19-34 (16)</td>
</tr>
<tr>
<td></td>
<td>learners</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Self-learning materials and its impact on</td>
<td>35-38 (4)</td>
</tr>
<tr>
<td></td>
<td>teachers</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Self-learning materials and development of</td>
<td>39-45 (7)</td>
</tr>
<tr>
<td></td>
<td>values in learners</td>
<td></td>
</tr>
</tbody>
</table>

In each category an equal number of positive and negative statements as far as possible were arranged at random. The statements were arranged in the draft form on a five point scale with the response strongly agree, agree, undecided, disagree and strongly disagree.

4.3.3.2 Scoring of the statements

For scoring, numerical values were assigned to the five categories of the responses as indicated below.
Table 3

Assignment of scores for the opinion

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive or favourable</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Negative or unfavourable</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

The score for each individual was computed by summing the weightage of the individual item responses. For the final selection of the items, the critical ratio of each statement was calculated. Critical ratio is a measure of the extent to which a given statement differentiates between the high and low groups of respondents.

As suggested by Edward (1957) the thumb rule of rejecting items with 't' value of less than 1.75 was followed. The experimental try-out was conducted on a sample of 185 student teachers from three teacher training institutions (mentioned earlier in table 1).

A group of 55 respondents with the highest scores constituted the high group and the group of 55 respondents with the lowest scores formed the 'low' group. 9 positive statements and 6 negative statements were rejected.
Finally 30 statements were selected, consisting of 18 positive statements and 12 negative statements.

### 4.3.3.3 Validity

a) **Content validity**: The related literature was the source for the items. The tool prepared was subjected to the scrutiny, criticism and comment of the experts in the field of Educational Technology. The tool was modified in the light of their comments and suggestions.

b) **Item validity**: Item validity emphasizes the extent to which an item predicts segregation of testes into “High versus low” criterion scores. The ‘t’ value was calculated for all the items in the following manner.

The total score for each statement was calculated from the opinion score of each respondent. The scores were then arranged in rank order and the top scoring 55 and low scoring 55 were taken, out of 185. Then the critical ratio ‘t’ or t-value of each individual statement was calculated using the formula.

\[
\frac{X_H - X_L}{\sqrt{\frac{\sum (X_H - \bar{X}_H)^2 + \sum (X_L - \bar{X}_L)^2}{n(n-1)}}}
\]

Where, \( X_H \) - The mean score of a given statements for the high group.
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$X_L$ - The mean score of a given statements for the low group

$X_H$ - Score of the individual item in high group

$X_L$ - Score of the same individual item in the low group

$n$ - Number of persons in each group

The items having $t$ - values 1.75 or more were retained in the final tool. (Care was taken to include in the final tool only those items which have high ‘$t$’ values) and is shown below.

**Table 4**

\begin{tabular}{|c|c|c|c|}
\hline
Sl.No. of the items (+ve or -ve item) & ‘$t$’ value & Serial No in the final draft & Remarks \\
\hline
+1 & 2.47 & & \\
+2 & 2.63 & & \\
+3 & 4.96 & 1 & \\
+4 & 3.95 & 2 & \\
-5 & 4.13 & 3 & \\
-6 & 0.328 & & \\
-7 & 2.66 & 4 & \\
+8 & 4.55 & 5 & \\
-9 & 2.73 & 6 & \\
+10 & 1.82 & & \\
+11 & 2.89 & 7 & \\
+12 & 3.34 & 8 & \\
-13 & 1.93 & 9 & \\
-14 & 0.812 & & Rejected \\
-15 & 0.51 & & Rejected \\
+16 & 1.134 & & Rejected \\
+17 & 4.88 & 10 & Rejected \\
+18 & 0.58 & & Rejected \\
\hline
\end{tabular}
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<table>
<thead>
<tr>
<th>Sl. No. of the items (+ve or -ve) item</th>
<th>‘t’ value</th>
<th>Serial No in the final draft</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>+19</td>
<td>2.16</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>-20</td>
<td>2.66</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>+21</td>
<td>4.35</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>+22</td>
<td>2.53</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>-23</td>
<td>3.58</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>+24</td>
<td>2.40</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>+25</td>
<td>0.89</td>
<td></td>
<td>Rejected</td>
</tr>
<tr>
<td>-26</td>
<td>2.58</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>+27</td>
<td>1.56</td>
<td></td>
<td>Rejected</td>
</tr>
<tr>
<td>-28</td>
<td>2.79</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>-29</td>
<td>6.73</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>+30</td>
<td>2.42</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>-31</td>
<td>2.215</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>+32</td>
<td>3.37</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>+33</td>
<td>5.53</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>-34</td>
<td>0.49</td>
<td></td>
<td>Rejected</td>
</tr>
<tr>
<td>-35</td>
<td>1.82</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>+36</td>
<td>1.87</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>-37</td>
<td>2.69</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>+38</td>
<td>1.93</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>+39</td>
<td>1.65</td>
<td></td>
<td>Rejected</td>
</tr>
<tr>
<td>-40</td>
<td>.74</td>
<td></td>
<td>Rejected</td>
</tr>
<tr>
<td>+41</td>
<td>2.47</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>-42</td>
<td>0.42</td>
<td></td>
<td>Rejected</td>
</tr>
<tr>
<td>+43</td>
<td>0.54</td>
<td></td>
<td>Rejected</td>
</tr>
<tr>
<td>+44</td>
<td>2.04</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>+45</td>
<td>2.39</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

12 statements having ‘t’ value lower than 1.75 and 3 other statements after considering the balance between positive and negative statements and also the number of the statements in each category, were rejected from the draft form. The remaining 18 positive statements and 12 negative statements were retained in the final form.
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The classification of statements in the final tool is as follows:

**Table 5**

**Classification of statements in the opinionnaire (Final Form)**

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Category</th>
<th>No. of statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General characteristics of self-learning materials</td>
<td>1-8(8)</td>
</tr>
<tr>
<td>2</td>
<td>Preparation and implementation of self-learning materials</td>
<td>9-10(2)</td>
</tr>
<tr>
<td>3</td>
<td>Self-learning materials and its impact on learners</td>
<td>11-23(13)</td>
</tr>
<tr>
<td>4</td>
<td>Self-learning material and its impact on teachers</td>
<td>24-27(4)</td>
</tr>
<tr>
<td>5</td>
<td>Self-learning materials and the development of values in learners</td>
<td>28-30 (3)</td>
</tr>
</tbody>
</table>

The test used for the draft and final are given in the appendix as 3A and 3B.

**4.3.3.4 Reliability**

Authors like Edward (1957) suggested the use of split-half method for finding the reliability of opinionnaire. In order to know the reliability, ‘r’ value was found out by the application of Spearman Brown formula. The reliability coefficient was found to be 0.74 and inferred that the tool is reliable for the population.
4.3.4. Questionnaire

The questionnaire seeks information about the availability and extent of use of self-learning materials and training provided in preparing and using self-leaning materials in teacher education institutions.

For preparing the questionnaire, the investigator has gone through a good number of books, journals and periodicals to attain a thorough knowledge of the field of study. The idea thus obtained was supplemented with the information obtained from experts and experienced teachers. Thus the investigator obtained all the necessary details regarding the various forms of self-learning materials, devices and equipments. The investigator gave special attention to prepare all the items in the questionnaire in simple, clear language and adopted a hierarchical order to arrange the items.

It was planned to divide the questionnaire into four parts.

The first part was to seek information about the availability and extent of use of self-learning materials, devices and equipments.

The second part was to seek information about the training provided in teacher education institutions for preparing and using self-learning materials.

The third part of the questionnaire seeks information about the problems faced in using self-learning materials and devices for teaching and learning purposes. Under this part there are 9 items. The target group were
asked to mark in the box against the items which they feel as problems in using self-learning materials and devices.

The **fourth part** of the questionnaire which has five items, collects suggestions for improvement in the use of self-learning materials and devices. The questionnaire used for the final study is given as appendix 4.

4.3.5 **Prepared self-learning materials**

The investigator collected the particulars of the available self-learning materials prepared on various topics and classes; but none was found for the use of secondary level student teachers. It is in this context that the investigator decided to develop self-learning materials and study the performance of student teachers in using these materials. The steps taken to develop the self-learning materials are given below. (Followed UNESCO guidelines, 1978).

- Selection of the topic
- Formulation of objectives
- Development of content outline
- Analysis of objectives
- Analysis of content
- Preparation of the packages
- Feedback
- Try out of the programme

The details of each step are given below.
4.3.5.1 Selection of the topic

The topic selected for the preparation of self-learning materials is ‘Some Significant Aspects of Measurement and Evaluation’ prescribed in the B.Ed. curriculum.

4.3.5.2 Formulation of objectives

Based on the content, objectives in terms of behavioural outcomes were formulated.

4.3.5.3 Development of content outline:

After behavioural objectives were formulated the content outline suitable for the attainment of objectives have been developed.

4.3.5.4 Analysis of objectives

The objectives were analysed in terms of their sequence to discover whether there were any gaps or overlaps among the objectives.

4.3.5.5 Analysis of content

The content was analysed and divided into 4 subunits. They are,

1. Concept of measurement and evaluation
2. Bloom’s Taxonomy of educational objectives
3. Tools of evaluation and
4. Characteristics of a good evaluation tool.
4.3.5.6 Preparation of materials

With regard to the selected topic and objectives to be attained the following three materials were prepared by the investigator.

I. Computer assisted instructional material
II. Instructional Module
III Multimedia Package

The procedure adopted in preparing these materials are given below:

I. Computer Assisted Instructional Material

The preparation of computer assisted instructional material consist of two phases.

1. Preparation of programmed learning material
2. Converting the prepared programmed learning material into computer assisted instruction

In the preparation of programmed learning material, the linear style of programming proposed by Skinner (1968) was followed. The principles involved are,

1. The learner works with the material individually at his own pace.
2. The students learn through a variety of carefully ordered sequence of materials to which they respond in some way or the other.
3. The material is so designed that the student makes very few errors.

4. The learner is immediately informed at every step whether his response is right or wrong.

Following the principles of preparing programmed learning material, the content was broken down into small units and arranged in a sequential order. Each unit was considered as frames. Each frame contains study material followed by an objective type question.

The prepared programmed learning material was converted into computer assisted instructional material. The PowerPoint presentation was used for developing the computer assisted instruction. Each presentation contains study material followed by an objective type question. The learners have to state their response after going through the material. The correct response is given in the following frame. The learners can check their response with the correct response. If their response is correct they can proceed to the next frame. If their response is wrong they can go back to the previous frame and try again. There are evaluation questions for self check at the end of each unit.

II. Instructional Module

As per the UNESCO (1978) guidelines the prepared instructional module contains the following components.
1. Title

2. Introduction: The introduction gives an idea about the target population for whom the module is prepared.

3. Overview: The overview presents the main theme of the module.

4. Instructions to the learners: Instructions to the learners as how to proceed and what he has to do.

5. Pre-test: In the present module the achievement test is used as the pre-test and post-test.

6. Objectives: The expected learning outcomes in terms of behavioural objectives are presented under this part.

7. Learning activities: The learning activities are provided in a planned and sequenced manner on the basis of the entry behaviour and needs of the learners.

8. Formative tests: At the end of each subunit evaluation questions were provided for self-check.

9. Summative evaluation: The summative evaluation was done with the help of post-test.

The learning modules prepared for each subunit was compiled in the form of a booklet.
III. Multimedia Package

According to Heimich et al. (1989), a multimedia package includes filmstrips, slides, audio-tapes, records, study prints and booklets. The multimedia package, prepared for the present study contained a study manual and a software package in a CD. The CD presents the learning material with colour, animation and explanations. The study manual contains the title, instructions to the learners, objectives, descriptions on the study material and evaluation questions for self-check on each unit.

All the three materials were shown to experts in the field of education and made corrections as per their suggestions.

4.3.5.7 Feedback

In the computer assisted instructional material at the end of each subunit, formative evaluation questions were asked for self-check by the learners. In the case of instructional module, correct responses were given at the end of the module inorder to attain mastery of the content. In multimedia package, students were asked to write the response and check them with the correct response given in the study manual. The post-test was conducted to measure the performance.

4.3.5.8 Try-out of the programme

The prepared computer assisted instructional material, instructional module and multimedia package were administered to three different groups
of 10 student teachers each. This enabled the investigator to improve the material on the basis of the feedback received from the student teachers. The investigator referred books of Kulkarni (1986) Coray (1962), Michael (1970), Dale (1954) Dunn and Dunn (1975), Rao and Ravisankar (1982) Bound (1989) and went through many journals before the final preparation of the learning materials and these were shown to experts in the field also. Based on the result from tryout and suggestions from experts, the materials were edited for the final study. The prepared materials and its CD are given as Appendices 5, 6, 7, 8 and 9.

4.3.6 Achievement test

In order to measure the dependent variable, an achievement test on the topic ‘Measurement and Evaluation’ was prepared by the investigator. It was decided to have multiple choice items in the achievement test. After the investigator was satisfied with the items prepared, it was shown to expert teacher educators to verify the suitability of the items for the target group. After carrying out the additions and deletions of the items there were 25 items in the achievement test with a maximum score of 25. Split half method was followed to find the reliability of the test. It was found to be 0.86, which showed a high reliability of the tool. The achievement test and scoring key are given as appendices 10 and 11.
4.4 POPULATION AND SAMPLE FOR THE STUDY

The sample for the survey part of the study consists of 1200 secondary level student teachers studying in the teacher education institutions of M.G. University, covering four districts of Kerala (Ernakulam, Kottayam, Idukki, Pathanamthitta) selected on the basis of random sampling technique. The sample selected were from aided colleges, unaided colleges and University Colleges of Teacher Education (UCTEs) and it comprises both male and female student teachers, student teachers of Arts and Science faculties, student teachers with graduation and post graduation and the details are given below.

Table 6

Sample selected for the survey

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the College</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>St. Joseph’s Training College, Mannanam</td>
<td>100</td>
</tr>
<tr>
<td>2.</td>
<td>St. Thomas Training College, Pala</td>
<td>100</td>
</tr>
<tr>
<td>3.</td>
<td>Titus 11 Teachers College, Thiruvalla</td>
<td>100</td>
</tr>
<tr>
<td>4.</td>
<td>St. Joseph Training College, Ernakulam</td>
<td>100</td>
</tr>
<tr>
<td>5.</td>
<td>Mangalam Training College, Ettumanoor</td>
<td>100</td>
</tr>
<tr>
<td>6.</td>
<td>H.M. Training College, Moovattupuzha</td>
<td>100</td>
</tr>
<tr>
<td>7.</td>
<td>Mar Thomas Training College, Ranny</td>
<td>100</td>
</tr>
<tr>
<td>8.</td>
<td>S.N.D.P. Yogam Training College, Adimaly</td>
<td>100</td>
</tr>
<tr>
<td>9.</td>
<td>U.C.T.E - Moovattupuzha</td>
<td>100</td>
</tr>
<tr>
<td>10.</td>
<td>U.C.T.E - Paippad</td>
<td>100</td>
</tr>
<tr>
<td>11.</td>
<td>U.C.T.E - Thodupuzha</td>
<td>100</td>
</tr>
<tr>
<td>12.</td>
<td>U.C.T.E - Elanthur</td>
<td>100</td>
</tr>
</tbody>
</table>

Total: 1200
The total sample again was classified into subsample according to sex, subject of study, qualification and nature of the colleges of education.

Table 7

Distribution of sample with regard to their characteristics

<table>
<thead>
<tr>
<th>Subsample</th>
<th>Number N</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>215</td>
<td>17.92</td>
</tr>
<tr>
<td>Female</td>
<td>985</td>
<td>82.08</td>
</tr>
<tr>
<td>Subject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science</td>
<td>663</td>
<td>55.25</td>
</tr>
<tr>
<td>Arts</td>
<td>537</td>
<td>44.75</td>
</tr>
<tr>
<td>Qualification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Degree</td>
<td>547</td>
<td>45.58</td>
</tr>
<tr>
<td>PG</td>
<td>653</td>
<td>54.42</td>
</tr>
<tr>
<td>Nature of the institution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unaided</td>
<td>400</td>
<td>33.33</td>
</tr>
<tr>
<td>Aided</td>
<td>400</td>
<td>33.33</td>
</tr>
<tr>
<td>Uni-Centre</td>
<td>400</td>
<td>33.33</td>
</tr>
</tbody>
</table>

The sample for the experimental part of the study consist of 160 student teachers from five optional subjects of St. Joseph Training College, Ernakulam. On the basis of their previous achievement, the student teachers were divided into four groups of 40 each. One groups was considered as control group and the other three groups as Experimental Group-I, Experimental Group-II and Experimental Group-III. The sample selected is shown in the following table.
Table 8

Sample selected for the experimental study

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Optional Subject</th>
<th>Control Group</th>
<th>Experimental Group-I</th>
<th>Experimental Group-II</th>
<th>Experimental Group-III</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>English</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>2.</td>
<td>Mathematics</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>3.</td>
<td>Physical Science</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>4.</td>
<td>Social Science</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>5.</td>
<td>Natural Science</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

4.5 PROCEDURE FOR DATA COLLECTION

Towards the end of the academic year the principals of the colleges of education were contacted personally and prior permission was sought for administration of the tools. The finalized tools i.e. the awareness test opinionnaire and questionnaire were administered on the sample keeping in view of all the precautions to be taken care of in a survey. Necessary instructions were given to student teachers to respond to the items in the tools. The filled in awareness test, opinionnaire and questionnaire were collected back on the same day itself.

4.6 EXPERIMENT CONDUCTED

The sample for the experimental study was selected by considering the previous achievement of student teachers and divided them into four groups.
Pre-test was conducted before starting the experiment to all the four groups. The prepared Computer assisted instructional material was given to experimental group-I, Instructional module was given to experimental group-II and the Multi-media package along with study manual was given to experimental group-III. They were asked to learn the units by themselves using the given self-learning materials under the supervision of the investigator. The control group was taught the same unit by conventional lecture method by the investigator herself. It took 3 weeks to complete the topic. After completing the topic, post-test was administered to all the four groups on the same day. The achievement test scores of the post-test were collected and used for analysis. The pre-test and post-test scores are given as appendix 12.

4.7 **STATISTICAL METHOD ADOPTED**

The main objective of the study is to assess the perception and performance regarding the use of self-learning materials. For this the scores obtained through all the tools were consolidated and analysed statistically. The mean weighted scores (MWS) and standard deviations of items in the awareness test and opinionnaire were found out. The ‘t’ test and ‘F’ test were used for comparison. The percentage of positive responses for all the items in the questionnaire were calculated and ‘z’ test was used for comparison.

In order to test the performance regarding the use of self-learning materials, paired ‘t’ test was done using the pre-test, post-test scores. Analysis of Covariance was applied for overcoming the slight difference in the per-test scores.