CHAPTER III

METHOD AND PROCEDURE
CHAPTER-III

METHODOLOGY AND PROCEDURE

3.1 Introduction:

The present chapter embodies the details with regard to overall scheme adopted for conducting the study in terms of research method, variable structures, population, sample and sampling research design, classification of subjects, data organization and tabulation and statistical techniques used. For which the investigator had adopted a set pattern of method and procedure to conduct this study.

A body of practices, procedures and rules used by those who work in a discipline or engaged in an inquiry, a set of working method is called methodology. Method means a systematic approach towards a particular phenomenon. Methodology used in an investigation in fact determines its density. It is the nature of technique and procedure adopted which determines the reliability, precision and validity of the data. In research, there are numerous methods and procedures to be adopted. But, it is nature of the problem under investigation, which determines the adoption of a particular method and procedure. After having a detailed study regarding methods and procedures the investigator had found descriptive survey method of research suitable to her study.

3.2 Descriptive Research Method:

For conducting any research it becomes inevitable to select the appropriate research method. Depending upon the objectives of the study the descriptive research method deemed appropriate and suitable and was used in the study.

A descriptive study describes and interprets what is. It is concerned with conditions or relationships that exist, opinions that are held, processes that are going on, effects that are evident or trends that are developing. It is primarily concerned with the present, although it often considers past events and influence as they relate to current conditions.

Descriptive research studies are designed to obtain pertinent and precise information concerning the current status of phenomena and whenever, possible to draw valid general conclusion from the facts discovered. Descriptive studies are more than just a collection of data; they involve measurement, classification, analysis, comparison and interpretation. They differ from other types of researches in purpose
and scope. Descriptive studies involve events that have already taken place and are related to present conditions.

According to Ary et al. (1972), “Descriptive research studies are designed to obtain information concerning the current status of phenomena. They are directed towards determining the nature of a situation as it exists at the time of study. There is no administration or control of a treatment as it is found in experimental research. Their aim is to describe “what exist” with respect to variables or conditions in a situation.”

Best (1980) holds that “The descriptive research method involves events that have already taken place. The only elements that researcher manipulates his method of observation and description in which he analyses relationship.”

Descriptive studies may be classified in the following categories:

i) Survey Studies,
ii) Interrelationship Studies and
iii) Developmental Studies.

The present study was mainly aimed at studying the Thinking and Learning Styles of Prospective Teachers in relation to their Self-Efficacy, Emotional Intelligence, Achievement-Motivation and Attitude Towards Teaching. In order to collect data for fulfilling the objectives of the study ‘Survey Method of Research’ was followed.

In survey method, a detailed description of exiting phenomenon is collected with the intent of employing data to justify current condition and practices or to make intelligent plans for improving them. The purpose of descriptive studies is not different from other forms of research, since such studies describe and interpret what conditions or relationships exist at present.

Weisberg and Bowen (1977) opined that “Survey Research permits us to study public opinion as well as attitude. It can also be used to obtain factual information. Not only is there variety, in the type of question, which can be explored with surveys, but there are variety of survey designs that can be used to accommodate different substantive needs and problems; if these problems are anticipated in the planning of survey. Survey Research can, therefore, be a flexible technique for ascertaining information about people.”

The prospective teachers under study have been drawn from Arts, Science and Commerce streams. Descriptive survey method of research was considered
appropriate for conducting the present study which aimed at investigating and further
describing the existing relationship between Thinking Style, Learning Style, Self–
Efficacy, Emotional Intelligence, Achievement-Motivation and Attitude Towards
Teaching of the Prospective Teachers. Since, descriptive survey research involves
events that have already taken place. Description method was preferred by the
investigator in view of the requirements of the present study through which the
existing relationship among these variable (Thinking Style, Learning Style, Self–
Efficacy, Emotional Intelligence, Achievement-Motivation and Attitude Towards
Teaching) were analyzed.

Further descriptive research studies are design to obtain precise information
concerning the current status of phenomenon and tried to draw the best and valid
possible general conclusion from the fact discovered.

Thus, the survey method gathers data from a relatively large number of cases
at a particular time. It is not concerned with characteristics of individuals as
individuals. It is concerned with the generalized statistics that results when data are
abstracted from a number of individual cases. It is essentially cross-sectional. It
pictures a prevailing condition at a particular time.

3.3 Design of the Study:

Research design is different from research method. It represents a structure
that guides the execution of a research method and analysis of the subsequent data; it
is the plan structure and strategy of the investigating variables. Research design
provides a framework for the collection and analysis of data. As a choice of research
design it reflects decisions about the priority being given to a range of dimensions of
research process. Designs are carefully worked out to yield dependable and valid
answers to research questions optimized by the hypotheses.

The design in the present study was 2x2x2x2 factorial. This design is usually
employed for finding out the effects of two or more independent variables operating
simultaneously on the dependent variable. The effect of these variables is studied
both in terms of the variables taken singly as well as taken together in different
combinations to find out the interaction effects.
3.3.1 Dimension of the Design:

The dimensions of a factorial design refer to the number of factors and the number of levels within each factor. The descriptive method was followed in the present study based on 2x2x2x2 factorial design. The four factors viz. Self-Efficacy, Emotional Intelligence, Achievement-Motivation and Attitude Towards Teaching are varied at two levels each; high and low. Effects of independent variables were studied both in terms of variables taken singly as well as taken together in different combinations to find out their interaction effects.

3.3.2 Layout of the Design:

The lay-out of the factorial design in respect of Thinking and Learning Styles followed for conducting the present study is given below in the figure 3.1 and 3.2 respectively.
Lay-out of the Factorial Design (2x2x2x2)

Self-Efficacy (S)

\[ S_1 \]

Emotional Intelligence (E)

\[ E_1 \]

Achievement-Motivation (N)

\[ N_1 \] \[ N_2 \]

Attitude Towards Teaching (A)

\[ A_1 \] \[ A_2 \] \[ A_1 \] \[ A_2 \] \[ A_1 \] \[ A_2 \] \[ A_1 \] \[ A_2 \] \[ A_1 \] \[ A_2 \] \[ A_1 \] \[ A_2 \]

Figure: 3.1 Thinking Style of Prospective Teachers
Lay-out of the Factorial Design (2x2x2x2)

Self-Efficacy (S)

Emotional Intelligence (E)

Achievement-Motivation (N)

Attitude Towards Teaching (A)

Figure: 3.2 Leaning Style of Prospective Teachers
From the layout given in the above figure 3.1 and 3.2, it is obvious that factors of Self-Efficacy, Emotional Intelligence, Achievement-Motivation and Attitude Towards Teaching are varied at two levels each. Factor of Self-Efficacy is designated as ‘S’ and its levels are S₁ and S₂ corresponding to high Self-Efficacy and low Self-Efficacy groups respectively. The second factor is Emotional Intelligence and is designated as ‘E’ and has two levels viz. E₁ and E₂ representing high and low Emotional Intelligence groups respectively. The third factor is Achievement-Motivation and it is designated as ‘N’ and has two levels viz. N₁ and N₂ corresponding to high and low Achievement-Motivation groups respectively. Fourth independent variable is Attitude Towards Teaching designated as ‘A’. It is also varied at two levels viz. A₁ and A₂ corresponding to high and low Attitude Towards Teaching groups respectively.

A treatment was obtained by selecting one level from each of the four factors, viz. one treatment would be S₁E₁N₁A₁ representing a treatment consisting of high Self-Efficacy for high Emotional Intelligence subjects having high Achievement-Motivation and high Attitude Towards Teaching. The total number of different combinations came out to be 2x2x2x2 = 16 as are shown in the following table 3.1:

Table 3.1: Treatment Combinations of 2x2x2x2 Factorial Design.

<table>
<thead>
<tr>
<th>Self-Efficacy</th>
<th>Emotional Intelligence</th>
<th>Achievement-Motivation</th>
<th>Attitude Towards Teaching</th>
<th>Treatment Combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>S₁</td>
<td>E₁</td>
<td>N₁</td>
<td>A₁</td>
<td>S₁E₁N₁A₁</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N₁</td>
<td>A₂</td>
<td>S₁E₁N₁A₂</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N₂</td>
<td>A₁</td>
<td>S₁E₁N₂A₁</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N₂</td>
<td>A₂</td>
<td>S₁E₁N₂A₂</td>
</tr>
<tr>
<td>S₂</td>
<td>E₂</td>
<td>N₁</td>
<td>A₁</td>
<td>S₂E₂N₁A₁</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N₁</td>
<td>A₂</td>
<td>S₂E₂N₁A₂</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N₂</td>
<td>A₁</td>
<td>S₂E₂N₂A₁</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N₂</td>
<td>A₂</td>
<td>S₂E₂N₂A₂</td>
</tr>
</tbody>
</table>
3.4 Variables Structure:

In general, variables are those which vary or change from person to person or situation to situation or variables are the conditions or characteristics that the experimenter manipulates, controls or observes. According to Kerlinger (1978), a variable is a symbol to which numerals or values are assigned. A variable refers to any dimension that has two or more changing values. A variable can be defined as an attitude in which individuals differ among themselves.

Variables can be classified in two main categories in the research. These categories are:

1. Independent Variables and
2. Dependent Variables.

An independent variable is the presumed cause of the dependent variable, the presumed effect. The independent variable is the antecedent; the dependent is the consequent.

The independent variables are the conditions or characteristics that the experimenter manipulates or controls in his/her attempts to ascertain their relationship to observed phenomena. The dependent variables are the conditions or characteristics that appear, disappear or change as the experimenter introduces removes or changes independent variables.

In the present study, Thinking Style and Learning Style were considered dependent/criterion variables and Self-Efficacy, Emotional Intelligence, Achievement-Motivation and Attitude Towards Teaching as the independent variables. The influence of these independent variables was analyzed on dependent variables. Each of the independent variables has been classified in two categories. For instance high Self-Efficacy and low Self-Efficacy, high Emotional Intelligence and low Emotional Intelligence, high Achievement-Motivation and low Achievement-Motivation, high Attitude Toward Teaching and low Attitude Towards Teaching.

3.5 Population:

According to Best and Kahn, (1993) "A population is any group of individual, have one or more characteristics in common that are of interest to be researcher. The population may be all the individuals of a particular type or a more restricted part of that group". A population may refer to any collection of specified group of human
being or of non-human entities such as objects, educational institutions, time units, and geographical areas, price of wheat or salaries drawn by individuals. A population can be finite or infinite.

The target population is the total group of subjects about whom the researcher is empirically attempting to learn something.

In the present study all the Prospective Teachers of Colleges of Education affiliated to Mumbai University, constituted the population of the present study.

3.6 Sample:

After defining a population and listing all the units, a researcher selects a sample of units from the list. A good sample must be as nearly representative of entire population as possible.

A sample is a portion of a population which is selected for the purpose of study or investigation. The essential requirement of any sample is that it is a representative as possible of the population from which it has been drawn. The scope of generalization of the finding depends on the representation of sample. A good sample is marked by following three characteristics:

i) freedom from bias,
ii) representativeness and
iii) adequacy in term of its size.

Best and Kahn a sample is small proportion of a population selected for observation and analysis. By observing the characteristics of the sample, one can make certain inferences about the characteristics of population from which it is drawn. Cocharan (1972) has pointed out the following advantages that accrue from using sample rather than the entire population:

(a) reduced cost,
(b) greater speed,
(c) greater scope and
(d) greater accuracy.

There are basic two requirements of good sample – its representativeness and its adequacy. If information from sample data is to be generalized to population, it is essential that sample should be represented of that population. In the strict sense of the term a representative the sample would be a miniature as or replica ideally in all respects of the population from which it has been drawn. A good sample not only
needs to be representative, it needs also to be adequate or of sufficient size to allow confidence in the stability of its characteristics.

In the present study, the sample consists of 2000 (two thousand) Prospective Teachers of 28 educational institutions affiliated to Mumbai University. A detailed structure of the samples has been provided in the table 3.2 below:

**Table 3.2: Institutional wise sample of Prospective Teachers.**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of the Institution</th>
<th>Number of Prospective Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Akbar Perbhoy College of Education, Sector-10A, Vashi.</td>
<td>55</td>
</tr>
<tr>
<td>2</td>
<td>All India Khilafat Committee’s College of Education, Byculla.</td>
<td>68</td>
</tr>
<tr>
<td>3</td>
<td>Bombay Teachers’ Training College, Coloba.</td>
<td>70</td>
</tr>
<tr>
<td>4</td>
<td>Hansraj Jivandas College of Education, Khar.</td>
<td>70</td>
</tr>
<tr>
<td>5</td>
<td>Gandhi Shikshan Bhawan’s Smt. Surajaba College of Education, Santacruz.</td>
<td>75</td>
</tr>
<tr>
<td>6</td>
<td>Oriental College of Education and Research, Andheri.</td>
<td>80</td>
</tr>
<tr>
<td>7</td>
<td>Smt. Kapila Khanddwal Sadhana Education Society, Santacruz.</td>
<td>75</td>
</tr>
<tr>
<td>8</td>
<td>Tilak Education Society College of Education, Turbhe.</td>
<td>70</td>
</tr>
<tr>
<td>9</td>
<td>National College of Education, Ulhasnagar.</td>
<td>70</td>
</tr>
<tr>
<td>10</td>
<td>Sheed Dhmolhond T Kalani College of Education, Ulhasnagar.</td>
<td>70</td>
</tr>
<tr>
<td>11</td>
<td>Seva Sadan’s College of Education, Ulhasnagar.</td>
<td>75</td>
</tr>
<tr>
<td>12</td>
<td>Pushpanjali College of Education, Vasai.</td>
<td>78</td>
</tr>
<tr>
<td>13</td>
<td>MCT’s College of Education and Research, Airoli.</td>
<td>73</td>
</tr>
<tr>
<td>14</td>
<td>Chembur Sarvankash Shikshan Shastra Mahavidyalaya, Chembur.</td>
<td>70</td>
</tr>
<tr>
<td>15</td>
<td>Gokhle College of Education, Khargar, New Mumbai.</td>
<td>73</td>
</tr>
<tr>
<td>16</td>
<td>Gurukrupa College of Education, Kalyan.</td>
<td>75</td>
</tr>
<tr>
<td>17</td>
<td>Oriental Educational Trust, National College of Education, Ulhasnagar.</td>
<td>73</td>
</tr>
<tr>
<td>18</td>
<td>Adarsh Shikshan Sanstha’s Vispute B.Ed. College, New Panvel.</td>
<td>68</td>
</tr>
<tr>
<td>19</td>
<td>Shahapur Taluka EducationSociety’s College of Education, Shahapur.</td>
<td>65</td>
</tr>
<tr>
<td>20</td>
<td>M.C.E. S. College of Education and Research, Mumbra.</td>
<td>72</td>
</tr>
<tr>
<td>21</td>
<td>Janta Shikshan Sanstha B.Ed. College, Kharghar.</td>
<td>70</td>
</tr>
<tr>
<td>22</td>
<td>Aishabai College of Education, Byculla.</td>
<td>75</td>
</tr>
<tr>
<td>23</td>
<td>Sainath Education Trust’s H.B. B.Ed. College, Vashi.</td>
<td>75</td>
</tr>
<tr>
<td>24</td>
<td>Govt. of Maharashtra’s Govt. College of Education, Panvel.</td>
<td>74</td>
</tr>
<tr>
<td>25</td>
<td>Govt. of Maharashtra’s Secondary Training College, Dhobi Talao.</td>
<td>68</td>
</tr>
<tr>
<td>26</td>
<td>Smt. Radhikabai Meghe Memorial Shikshan Sanstha, Airoli</td>
<td>88</td>
</tr>
<tr>
<td>27</td>
<td>N.C.R.D.’s Sterling College of Education, Nerul.</td>
<td>55</td>
</tr>
<tr>
<td>28</td>
<td>Bhagvan Das College of Education, Thana Naka.</td>
<td>70</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>2000</strong></td>
</tr>
</tbody>
</table>

3.7 Sampling:

The process of the drawing of a sample from a large population is referred to as sampling. The process makes it possible to draw valid inferences or generalization
on the basis of careful observation of variable with in a relatively small portion of the population.

Mouly (1964), sampling is both necessary and advantageous. Taking a complete census is generally both costly and difficult; in many cases it is completely impossible. What is not so clearly recognized by a lay man, who feels that one takes a sample when he cannot act as complete census, is that sampling frequently results in more adequate data than complete census. In an interview study, for example, sampling not only saves money but also permits greater care and controlled to be asserted, it allows for better training and coordination among the interviewers; it permits greater depth in interviewing; it allows the interviews to be conducted in a relatively short time so that the distorting effects of the passage of time are minimized; it also permits greater depth in analysis and greater accuracy in processing.

Best and Kahn (1993) told that the primary purpose of the research is to discover the principle that have universal application, but to study a whole population to arrive at generalization would be impracticable, if not impossible, some populations are large that their characteristics cannot be measured, before the measurement could be completed the populations would have changed.

Sampling procedure can be broadly classified into two categories:
(a) probability sampling and
(b) non-probability sampling.

The probability sampling procedure are based on random selection as the fundamental elements of control permit the specification of the precession that can be obtained and size of the sample required for that purpose. On the other hand, non-probability sample procedures are based on the judgment of the investigator as the most important element of control.

The guiding principles of non-probability sampling procedures are the availability of the subject, the personal judgment of the investigator and convenience carrying out survey.

In the present study, first of all the colleges of education included in the sample were selected on the basis of random method of sampling by adopting a lottery system. The names of colleges of education were written on the slips and placed it in a container. All the slips were mixed well in the container. A little girl
was asked to pick up one slip from the container and that picked slip of college was included in the sample. This process was done with replacement technique of the sampling. In this way, 28 colleges were selected for sample. Thereafter, within each institution only English medium Prospective Teachers were taken up for the study. Only those Prospective Teachers were considered for the study that had filled up all the questionnaires, complete in all respects, for the analysis purpose.

3.8 Tools of Research:

For collecting desired data for the study of any problem the researcher may be used various devices and instruments. These instruments are called tools. The selection of the tool is of paramount significance in any scientific investigation. The success of research is largely depending upon the instrument which is used for the data collection. Each research tool is appropriate in a given situation to accomplish a particular purpose. Therefore, selection of the tool is to be made wisely by the investigator. The research tools may be either already available in the field or may be required to be developed by the researcher. For this, the researcher should familiarize himself/herself with the nature, merit and demerits of existing tools.

The research study requires relevant data from many sources direct or indirect. The data should be adequate in quantity or quality, reliable and valid. Tools are the means of data collection, suitability, validity and language. Different tools are suitable for collecting various kinds of information for various purposes. The investigator may use one or more tools for his/her purpose.

Best (1983) is of the view that validity and reliability are qualities that are essential to the effectiveness of any data gathering tools. Validity is the procedure that enables it to determine what it was designed to determine. Reliability is the quality of consistency that the instrument or procedure demonstrates over a period of time. Whatever it determines, it does so consistently.

Bennett (1973) suggests that at least five factors should be taken into account when selecting the tools for data collection. They are mentioned as follows:
1. Reliability: A test is reliable to the extent that it measures whatever it is measuring consistently.
2. Validity: In general, a test is valid if it measures what it claims to measure.
3. Time to Administer: How long does the measuring instrument take to administration and is there sufficient time to use it within the confines of the study?

4. Expertise Required: The investigator require special expertise in order to use instrument or it can be used with standard instructions by anybody.

5. Administration Procedure: Biases are likely to be introduced into the subjects’ responses depending on the administration procedures employed and situation in which the instrument is used.

Keeping in view the above – mentioned criteria, the investigator has selected the following tools for data collection in the present study:


3.9 Description of the Tools Used in the Study:

The above tools of the research were very carefully selected for conducting the present study after having deep study regarding the suitability and appropriateness of the tools. The detailed discussion of every tool used in the present study is given below:

3.9.1 Thinking Style Inventory:
In order to measure Thinking Style of the Prospective Teachers Thinking Style Inventory developed and standardized by R.J. Sternberg was used in the present study. Thinking Style Inventory consists of 104 items related to thirteen dimensions namely legislative, executive, judicial, monarchic, hierarchic, oligarchic, anarchic, global, local, liberal, conservative, internal and external. The respondent has to rate each of the statements on a 7 point rating scale i.e. 1 =not at all well, 2 = not very well, 3 = slightly well, 4 = somewhat well, 5 = well, 6 = very well, and 7 = extremely well.

The reported internal consistency coefficient obtained from an independent sample of school students prior to use, range from 0.55 to 0.83 suggesting adequate reliability of the instrument. Apart from reliability the tool has construct validity to the level of satisfaction.
The test was used widely in Indian condition. However, the investigator had tried to check the reliability of the said test by employing test – retest method. A sample of 50 Prospective Teachers from session 2010-2011 was selected randomly from the nearby educational institution. Tool was administered on the subjects twice with an interval of one month.

On completion, it was scored with the help of scoring key. Thereafter, the correlation between the scores obtained on the first and second administration was computed by Pearson’s Product moment method. The reliability coefficient of correlation was found 0.52 to 0.76 which is parallel to the reliability indices of the author of the test.

**Scoring Procedure:**

The way to evaluate score is to add up the rating numbers wrote down by the Prospective Teachers and then divided by 104. The total Thinking Style score of the Prospective Teachers was taken for the analyses purpose.

A copy of Thinking Style Inventory is given in appendix “A”.

**3.9.2 Learning Style Inventory:**

The tool is an adaptation of Kolb’s Learning Style Inventory in an Indian context by Ritu Dangwal and Sujata Mitra (1998). This test consists of 52 forced items of which 26 items measures the AC-CE continuum and 26 items measures the AE-RO continuum.

The respondents are asked to check on either a) or b) which statement is applicable to them. Likewise, the respondents checked all the 52 items. This Inventory assesses four Learning Styles namely imaginative, analytical, precision and dynamic.

**Reliability:**

The overall reliability for the 52 items was found to be Alpha Cronback .66 which is relatively high. When split half alpha taken for the 26 items, alpha part 1 was observed to be .57 and alpha part 2 was observed to be .56 which again was found to be relatively high. Thus the reliability of the test was observed to be very high.

**Validity:**

When inter-dimensional validity was studied it was observed that AE vs. RO was observed to be minus 1.00 (<.01 level) and AC vs. CE was observed to be minus 1.00 (<.01 level). Thus the bipolar dimensions were found to be significantly
negatively correlated. In other words, if an item on AC is high then the same item would be low on the CE dimension and the same applies to the AE vs. RO continuum. There is negative correlation between the bipolar dimensions, thereby indicating a high inter-dimensional validity.

If we now examine the relationship between Learning Style and Jung's psychological types we find that the dynamic quadrant or the accommodator is negatively correlated with the analytical learner or the assimilator (ACRO and AECE are significantly negatively correlated = -1.00 (<.01 level)) Similarly, the precession learner or the converger is negatively correlated with the imaginative or diverger.

If we examined the correlation between the 4 dimensions, AC and AE are negatively correlated (minus .204), AC and RO is positively correlated (.204), RO and CE are negatively correlated (minus .204) and CE and AE is positively correlated (.204). This implies that even though the correlations are not significant there are certain items between the dimensions that are overlapping and there are other items between the dimensions that are not overlapping.

On the basis of the above it was concluded by the author that this new Learning Style test holds a test of promise given the size and diversity of the student population.

A copy of the Learning Style is given in Appendix-"B".

3.9.3 The General Self-Efficacy Scale:

Teacher's Self-Efficacy was assessed through Schwarzer's General Self-Efficacy scale adapted by Nain Singh in 2000. It aims at to assess abroad and stable sense of personal competence to deal efficiently with a variety of stressful situations; the German version of this scale contained originally 20 items and was later reduced to 10 items. (Jerusalem and Schwarzer 1986, 1992 and again Schwarzer and Jerusalem 1989). It has been used in numerous research projects where it typically yielded coefficients of internal consistency between alpha 0.75 and 0.79. The scale is not only parsimonious and reliable but valid also. Test-Retest reliabilities and different kinds of experimental, criterion related and predictive validity of the scale were turned out to be very satisfactory.

The coefficient of internal consistency for 10 item scale, estimated by Cronbach's alpha was 0.91 which is very high. However, before using the General Self-Efficacy Scale in the present study, an attempt was made by the investigator to find out its reliability in Indian context on a sample of 50 Prospective Teachers of
educational institution affiliated to Mumbai University. The test-retest method was used to determine the reliability.

After one month from first administration, the scale was re-administered on the same sample. Coefficient of correlation was computed by Pearson’s product moment method. Table 3.3 below gives the result of test-retest reliability:

**Table 3.3: Test-Retest Reliability Coefficients for General Self-Efficacy Scales on an Indian Sample (N=50), (Interval=1month).**

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Scale</th>
<th>Coefficient of Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The General Self-Efficacy Scale</td>
<td>0.783</td>
</tr>
</tbody>
</table>

The coefficient of correlation is somewhat lower than the Schwarzer’s coefficient of correlation but it seemed to be satisfactory.

**Scoring:**

The generalized Self-Efficacy scale is a self-administer normally takes two to three minutes to complete. Respondents are required to indicate the extent to which each statement applies to pattern ranging for ‘Not at all true’ which score ‘1’ to ‘exactly true’ which score ‘4’. The score of each of the ten items are summed to give a total score. Thus the range of possible score for this instrument could vary from a minimum score of 10 to a maximum score of 40. The score on this scale reflects the strength of an individual’s Self-Efficacy belief. Thus, the higher the score, the greater is the individuals generalized sense of Self-Efficacy.

The copy of the scale is given in Appendix “C”.

**3.9.4 Emotional Intelligence Inventory:**

The present teacher’s Emotional Intelligence inventory (tEQI) designed and standardized by Dr. Shubhra Mangal was devised in order to measure the Emotional Intelligence of secondary, senior secondary school teachers and Prospective Teachers in Indian context. In this tool, Shubhra Mangal has selected 28 dimensions/variables arbitrarily by which the Emotional Intelligence of teacher is governed which are also termed as emotional competence. The Emotional Intelligence of teacher broadly constitutes personal and social competence where the domain social competence is totally different in case of teachers. The domain social competence includes various interactions at micro and macro level. Dealing with vast individual differences in the
form of a variety of students, requires substantial empathy, patience and flexibility in the emotional repertoire of the teacher.

The subjects were classified into 5 categories on the basis of the raw scores obtained by them on the final form of tEQi as below:

A Very High Emotional Intelligence
B High Emotional Intelligence
C Average Emotional Intelligence
D Below Average Emotional Intelligence
E Poor Emotional Intelligence

**Reliability:** Reliability of the inventory was established through two methods;

a) Test – Retest Method and

b) Split – Half Method.

The results arrived by these tests are summarized in table 3.4 below:

**Table 3.4: Reliability Coefficients of the Teachers' Emotional Intelligence Inventory**

<table>
<thead>
<tr>
<th>Method used</th>
<th>Test-Retest Method (N = 150)</th>
<th>Split-Half Method (N = 200)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability coefficients</td>
<td>0.96</td>
<td>0.95</td>
</tr>
</tbody>
</table>

**Validity:** To access the accuracy of the tool, three types of validity measures were obtained;

(a) Content Validity,
(b) Construct Validity and
(c) Criterion Related Validity.

The results obtained are summarized here in table 3.5 below:

**Table 3.5: Validity Coefficients of the Teachers' Emotional Intelligence Inventory**

<table>
<thead>
<tr>
<th>Measures used</th>
<th>Mangal's Teacher Adjustment Inventory (MTAI) (N = 200)</th>
<th>Ratings of Teachers by their Headmasters (N = 500)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Validity Coefficients</td>
<td>0.55</td>
<td>0.65</td>
</tr>
</tbody>
</table>
**Administration:** The test was administered to the Prospective Teachers by keeping the instruction in mind given in the manual of the test.

**Scoring:**

The items in the inventory are either in nature of positive statements or the negative statements. The system of scoring the positive and negative natured items in the inventory is as shown in Table 3.6 below:

<table>
<thead>
<tr>
<th>Nature of the item</th>
<th>Choice made by the respondent</th>
<th>Score awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEGATIVE</td>
<td>A</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>5</td>
</tr>
<tr>
<td>POSITIVE</td>
<td>A</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>1</td>
</tr>
</tbody>
</table>

A copy of Emotional Intelligence Inventory is given in Appendix “D”.

**3.9.5 Achievement-Motivation Scale:**

Achievement-Motivation of Prospective Teachers was measured through Achievement-Motivation Scale by Pratibha Deo and Asha Mohan. Achievement-Motivation Scale consists of 50 items relating to 19 dimensions/factors.

**Reliability:** Test-retest method was applied to obtain the reliability coefficient of the scale. Taking different sets of sample, the administration of the scale was repeated on several occasions. The results are given below in Table 3.7:

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Interval</th>
<th>R</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed Group</td>
<td>51</td>
<td>4 – weeks</td>
<td>.69</td>
<td>.01</td>
</tr>
<tr>
<td>Males</td>
<td>33</td>
<td>5 – 6 weeks</td>
<td>.67</td>
<td>.01</td>
</tr>
<tr>
<td>Females</td>
<td>50</td>
<td>5 – 6 weeks</td>
<td>.78</td>
<td>.01</td>
</tr>
</tbody>
</table>
These coefficients of reliability are sufficiently high and the scale can be considered as reliable for use.

**Validity:** In the first instance the item validity established by the high-low discrimination method was accepted as the validity of the whole measure. Besides, this scale was also used for validating the projective test of Achievement-Motivation.

The coefficient of correlation between the scale and the projective test was observed to be 0.54 which speaks for the validity of the scale also; the validity form is of concurrent in nature. Finally the scale scores were also correlated with the scores obtained by administering the Aberdeen Academic Motivation Inventory of Entwistle (1968) yielding a coefficient of correlation as .75 for a mixed sample of 0.93. This correlation is high enough to establish the validity of the scale.

**Scoring:**

One Stencil Keys is to be used for scoring positive and negative items. A positive item carries the weights of 4,3,2,1 and 0 for the categories of Always, Frequently, Sometimes, Rarely and Never respectively. The negative item is to be scored 0,1,2,3 and 4 for the same categories respectively that are given above. Separate Keys for positive and negative items are available.

The total score is the summation of all the positive and negative items scores. The minimum obtained score can be 0 (zero) and the maximum can be 200, others scores ranging in between these limits.

A copy of Achievement-Motivation Scale is given in appendix “E”.

3.9.6 **Teacher Attitude Scale:**

The present teacher attitude scale designed and standardized by Dr. J.C. Goyal. The purpose of the scale is to measure the attitude of practicing and Prospective Teachers towards teaching profession. It is a scale consisting of 22 items. It has been developed by using Thurston technique of attitude scale construction. First of all, the author collected statements of opinion about the teaching profession from teachers, on the basis of their teaching experience. The statements of opinion were got rated on an 11-point scale by 88 teacher judges. The 11 points indicate the scale continuum, the lower point indicating a favorable attitude towards the profession and higher indicating an unfavorable attitude. From the original list of 125 statements only 22 statements were retained with lower Q-value in such a way that two statements fell on each interval of the scale continuum.
Thus, 10 items with lowest scale values falling on first five intervals from 0-5 indicated a favorable attitude and 10 items on the last five intervals from 6-11 with highest scale values indicated an unfavorable Attitude Towards Teaching. Two statements falling on the interval 5-6 indicate a neutral attitude towards the profession of teaching.

**Reliability:** Reliability of the scale was determined by the split-half method. It was found to be 0.90 by the Pearson’s product-moment correlation method. When corrected by Spearman-Brown Formula, its co-efficient of correlation was 0.95.

**Validity:** Content validity of the scale was ensured by the judges, who carefully rated each item. The validity of the scale was also determined by self-rating by subjects on a graphic continuum of the scale. It was found to be 0.78.

**Administration of the Scale:**
Each subject was to respond by reacting to the statement and put a tick mark against those items only with which he/she agreed.

**Scoring:**
Each statement has been assigned scale value. The attitude of a subject is the sum total of the scale values of the statements ticked by the subject divided by the number of statements marked by him/her. It may be represented by the following formula

\[
\text{score} = \frac{\sum 1 + 2 + 3 - \ldots + n}{N}
\]

Where 1, 2, 3, ----- are the scale values of statements marked and N is number of statements ticked.

Thus the mean attitude score of a subject is the average score value of the statement endorsed by him/her. It is to be noted that a lower mean score indicates a favorable attitude and the higher mean score indicates unfavorable attitude of a subject.

The copy of the test is appended at appendix “F.”

**3.10 Data Collection and Scoring:**
The data were collected by the investigator in a group setting after obtaining the prior written permission of the head of the institutions of the concerned colleges. However, before administration of the tests, needed emotional rapport was established with Prospective Teachers. Necessary instructions were given pertaining to recording the responses. They were told regarding the importance of their willing and sincere
cooperation in the data collection to the research study. Every effort was made by the investigator to get the data objectively as much as possible. The above mentioned 6 tools were administered in two setting.

The data were collected by administering the six tools on the Prospective Teachers on prefixed schedule. Before administering the tools, the researcher put the Prospective Teachers at ease by explaining briefly the purpose of administration and motivated them well to give their honest expressions.

The Prospective Teachers having English medium were considered for the study. First of all the investigator distributed the booklets cum answer sheets and asked them to fill in the required information on the first page.

The researcher read the general instructions and asked the subjects also to read the instructions carefully themselves. A pause was given and subjects were asked to remove the doubts, if any, when it was ascertained that the trainees were clear about answering process, they were asked to open the booklets. Optimal time was given to them to complete the work. Before they finished their work and returned booklet cum answer sheets, they were asked to check their answer sheets, if any of the items left unmarked. At the end of the testing program, the investigator expressed her gratitude by thanking the subjects for their kind co-operation. The same procedure was followed to collect the data from the every institution selected for the purpose. The Scoring of the various Inventories/Questionnaires/Scales were done with the help of instructions given in the manual and standard scoring keys developed by the authors of the concerned tools. The scores thus obtained were recorded for further analysis.

3.10.1 Classification of Subjects:

The entire sample of 2000 subjects was divided into two groups each on the basis of Self-Efficacy, Emotional Intelligence, Achievement-Motivation and Attitude Towards Teaching separately.

Kalleys (1939) criterion for taking top 27 % and bottom 27 % was used for dividing the sample pool into high and low groups respectively in respect of the variables of Self-Efficacy, Emotional Intelligence, Achievement-Motivation and Attitude Towards Teaching. The upper cases, 540 of each group represented the top group viz. $S_1E_1N_1A_1$ and lowermost cases, 540 represented the lowest group viz. $S_2E_2N_2A_2$. Eight groups, thus, formed were $S_1$ and $S_2$, $E_1$ and $E_2$, $N_1$ and $N_2$, and $A_1$ and $A_2$ consisting of 540 subjects in each group.
Now the common cases falling in the different sixteen combinations viz., 
$S_1E_1N_1A_1, S_1E_1N_2A_2, S_1E_2N_1A_1, S_1E_2N_2A_1, S_1E_2N_1A_2, S_1E_2N_2A_2,$
$S_2E_1N_1A_1, S_2E_1N_1A_2, S_2E_1N_2A_1, S_2E_1N_2A_2, S_2E_2N_1A_1, S_2E_2N_1A_2,$
$S_2E_2N_2A_1, S_2E_2N_2A_2$ were picked up. It was observed that there was unequal numbers of cases 
into each of the above mentioned categories. The minimum number of cases in one 
group was 15. From the rest of the groups having higher number of cases, 15 cases 
were randomly picked up to make the number equal in all treatment combinations. 
Thus 240 (15x16) cases in all were selected for the final data analysis.

3.11 Organization and Tabulation of Data:

The data were tabulated and organized according to the objectives of the 
study. The classificatory variables were Self-Efficacy, Achievement-Motivation, 
Emotional Intelligence and Attitude Towards Teaching. Therefore, the scores of each 
Thinking and Learning Styles in each group were tabulated and organized 
accordingly.

3.12 Statistical Techniques:

Analyzing the results of 2x2x2x2 factorial design, the main effects of the four 
factors viz. Self-Efficacy, Emotional Intelligence, Achievement-Motivation and 
Attitude Towards Teaching were calculated by employing the method of analysis of 
variance.

For the purpose of analysis, the total scores on Thinking and Learning Styles 
(dependent variables) were taken separately.

Analysis of variance was applied to sixteen combination groups.

The treatment sum of squares has 15 df, with 15 component parts as follows:

1. Comparison of the sum of squares of high and low Self-Efficacy (Main effects 
of ‘S’).
2. Comparison of the sum of squares of high and low Emotional Intelligence 
(Main effects of ‘E’).
3. Comparison of the sum of squares of high and low Achievement-Motivation 
(Main effects of ‘N’).
4. Comparison of the sum of squares of high and low Attitude Towards Teaching 
(Main effects of ‘A’).
Two factor interactions of:

5. S x E  
6. S x N  
7. S x A  
8. E x N 
9. E x A 
10. N x A 

Three factor interactions of:

11. S x E x N 
12. S x E x A 
13. E x N x A 
14. N x S x A 

Four factor interactions of:

15. S x E x N x A. 

According to Lindquist (1956) the weighted average of the simple effects for all levels of the criterion variable is known as the ‘main’ effect of the treatments.

Analysis of variance gives a global picture about the nature of variance. The ‘F’ ratio cannot point out which and how many means are significantly different. For this purpose, ‘t’ values were calculated. The data thus, collected with the help of above mentioned tools, were subjected to statistical analysis to find out the nature and direction of variance. The data were analyzed with the help of SPSS package 16.

3.12.1 Analysis of Variance:

The analysis of variance is a method for dividing the variation observed in the data, into different parts, each part assignable to a known source, cause or a factor. The main characteristics of these techniques are that variance can be simultaneously analyzed into two components: the mean of the variances within the group and variance of the group means. It can also be applied to study the interaction effect.

In the analysis of data, the total sum of squares is broken up into between subjects and within subjects’ components.
In testing the significance of difference through these standardized techniques, the F-ratio is computed. If F-ratio is not found to be significant, further analysis is not required, as it seems that no difference between the groups exist. If F-ratio is significant, further testing becomes inevitable with the help of ‘t’ test.

However, ANOVA is considered more versatile technique than ‘t’ test. A ‘t’ test can be used only to test difference between two means while in analysis of variance a ratio of observed difference/error term is used to test the hypotheses. This ratio is called F-ratio, which employs the variance (σ) of group means as a measure of observed differences among groups. The total variance of all subjects in an experiment can be analyzed into two variance between or among is a part of the numerator in “F”-ratio. Variance within is a part of the error term of the denominator. As variance between group increases, the ‘F’ - ratio decreases. The number of subjects influence the ‘F’ ratio, larger the number greater the ‘F’ - ratio. When the numerator and denominator are equal the difference between group means are no greater than would be expected by chance. The value of ‘F’-ratio is computed by employing the following formula:

\[ F - \text{ratio} = \frac{\text{Between groups variance estimate} \ (S_B^2)}{\text{Within group variance estimate} \ (S_w^2)} \]

In the present study, post-hoc analysis was done by applying ‘t’ test to compare the different groups of Prospective Teachers.

### 3.12.2 The ‘t’ Test:

The ‘t’ test is a statistical test that allows the investigator to compare two means to determine the probability that the difference between the means is an actual difference rather than a chance difference. The following formula was used for calculating ‘t’ test.

\[ t = \frac{|M_1 - M_2|}{\sqrt{\frac{SD_1^2}{n_1} + \frac{SD_2^2}{n_2}}} \]

Where \( M_1 \) = Mean of the first group.

\( M_2 \) = Mean of the second group.

\( SD_1^2 \) = Standard deviation of the first group.

\( SD_2^2 \) = Standard deviation of the second group.
SD_2^2 = Standard deviation of the second group.
n_1 = Number of cases in the first group.
n_2^* = Number of cases in the second group.

The significance of t-ratio is found with the help of table of 't' values which indicates the critical values of 't' - ratio necessary to reject the null hypothesis at selected level of significance with a df of sample.

Besides above mentioned two statically techniques, the graphic techniques were utilized to depict the difference in mean scores of criterion variables in respect of various groups.