Chapter III

RESEARCH METHODOLOGY

This chapter explains in detail the Research Methodology followed for present research. The contents of methodology are given below:

3.1 Descriptive Survey (DS) Design
3.2 Methodology followed for Pilot Study and Final Study
3.3 Concept of Pilot study
   3.3.1 Objectives of Pilot study
3.4 Designing the Tools for Pilot study
3.5 Sampling for Pilot Study
3.6 Establishment of Content Validity and Reliability of the tools
   3.6.1 Concept of Content Validity of the tools
   3.6.2 Concept of Reliability of the tools
3.7 Plan of Statistical Tools used for Analysis of raw data
   3.7.1 Concept of Chi-square Analysis
   3.7.2 Concept of Percentage Analysis
   3.7.3 Concept of Factor Analysis
   3.7.4 Concept of Mann-Whitney U-Test
3.8 Criteria for retaining the test items in the tools
3.9 Design of Final Study
   3.9.1 Sampling Procedure for Final Study
   3.9.2 Tool-wise collection of data

3.1 Descriptive Survey (DS) Design:

Researcher has adopted Descriptive Survey method for present research. The concept of DS has been clarified as follows:

(i) As given by Glass and Hopkins (1984), involves gathering data which describes the events, organizes, tabulates, depicts and describes the data collection. In
order to understand the data distribution the use of visual aids like graphs and charts sounds very useful in this method.

(ii) DS needs standardized tools or instruments so that the resulting measurement would be accurate, reliable and generalizable.

(iii) The qualitative information that is collected by using various tools is quantified & then subjected to statistical procedures to arrive at definite conclusions.

(iv) A large mass of raw data is reduced to manageable form by applying Descriptive statistical tools such as- measures of central tendencies, variation, skewness, kurtosis percentage etc. Along with it Inferential statistical tools like chi-square, t-ratio, Path analysis, Factor analysis, Logistic regression etc. are used to draw conclusions. Depending on the objectives and hypotheses of the research, most appropriate statistical tools are selected and on the basis of results, inferences are drawn.

(v) Sampling is a very important part of descriptive survey research. Depending on the purpose of research, the most suitable sampling procedure is adopted. Sample size also depends on the kind of problem and the extent of precision that is required to draw valid conclusions.

(vi) DS can be observational study, correlation research, development design and survey type of research, but it does not explain cause and effect relationship or cannot make predictions. It just describes the situation.

(vii) Research in education usually involves observation, interview and survey techniques to collect data about various issues in educational set up like schools/college.

(viii) DS also involves designing of models and testing their compatibility on the basis of responses received from the respondents.

(ix) DS employs pilot study on small scale, before the research design is implemented on large sample in order to make improvement in the tools and research approach.

(x) Some descriptive research projects are designed to help policy makers and educators to implement new policies in education on mass scale or to see the effectiveness of various policies after their implementation.
(xii) On the basis of the results of statistical tools, valuable recommendations are made in DS.

(xii) Thus descriptive research examines the situation as it is. It explains ‘what is’ and involves identification of characteristics of an observed phenomena and arrives at conclusions after quantifying the observations.

Since present research has been planned to find out an association various factors with job satisfaction of teacher educators in BEd colleges, descriptive survey design was found to be the most appropriate approach and the same has been discussed in detail as follows:

3.2 Methodology followed for Pilot Study and Final Study

After deciding dependent and independent factors (as discussed in Chapter 1) associated with job satisfaction of teacher educators the next task was to do pilot study, for which it was customary to make the tools that would help the researcher to achieve the objectives of present research. For this purpose researcher designed a plan of pilot and final study which is presented as follows:

**Flow Chart: III (1)**

Methodology Followed

(Descriptive Survey)

Pilot Study
- Objectives
- Designing of Tools
- Sampling Procedure
- Data Collection
- Content Validity of Tools
- Reliability Coefficient of Tools
- Selection of Items in Final Tools

Final Study
- Making Final Tools
- Sampling Procedure
- Data Collection
- Analysis of Data
- Conclusions
3.3 Concept of Pilot Study:

(i) As defined by Oxford Thesaurus, a pilot study is experimental, exploratory, test, preliminary, trial or try out investigation.

(ii) It is small study designed to gather information prior to larger study in order to improve the quality of final study.

(iii) It permits preliminary testing of hypotheses, changing some hypotheses or discarding some or developing new hypotheses.

(iv) It helps in keeping check on the research methodology followed.

(v) It helps to test the feasibility, validity and reliability of the proposed study design, thus directs the researcher to make the final tools.

3.3.1 Objectives of Pilot Study:

(i) To design the tools for present research.

(ii) To find out the content validity of every item in the tools.

(iii) To find out the reliability coefficient of the tools.

(iv) To accept or reject or improve the test items in the tools on the basis of validity and reliability coefficients.

(v) To make revised tools for final study.

3.4 Designing the Tools for Pilot Study:

Researcher decided to make three tools, to test ‘Six-Factor Cascade Model of Job Satisfaction’ & Null Hypotheses, for this Descriptive Survey Study. The tools are presented in the form of flow chart as follows.

Flow Chart: III (2)

Tools

(1) Questionnaire

Demographic Information (Independent Factors)

Job Satisfaction Scale (JSS) (Dependent Factors)

(2) Observation Check List

Infrastructure of BEd colleges

Structured Informal

(3) Interview
Tool (1): Questionnaire

The Questionnaire is divided into two parts viz- Demographic Information (DI) and Job Satisfaction Scale (JSS). First part of DI deals with personal information of teacher educators (Independent factors) and second part deals with JSS. The items related to six dependent factors and sub-factors therein are included in JSS. The detailed plan of Questionnaire is as given in following flow chart.

Flow Chart: III (3)

Tool (1): Questionnaire

Demographic Information

(Job Satisfaction Scale (JSS))

(Independent Factors)

- Type of college
- Gender
- Qualification
- Status of the job
- Pay package
- No of subjects teaching
- No of students for lesson guidance
- Average no. of lessons supervised per day
- Teaching experience
- Special skills

(Dependent Factors)

Items based on ….

- Physical Factors
- Physiological Factors
- Psychological Factors
- Sociological Factors
- Philosophical Factors
- Spiritual Factors
A total of 91 items were framed in the questionnaire. Out of it 10 were based on Independent Factors (Demographic information) and 81 were based on Dependent Factors related to job satisfaction. (Appendix: A and B)

**Tool(2): Observation Check List**

Various infrastructural aspects included in this tool are as given below:

<table>
<thead>
<tr>
<th>No</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Principal’s room</td>
</tr>
<tr>
<td>2</td>
<td>Staff room</td>
</tr>
<tr>
<td>3</td>
<td>Office</td>
</tr>
<tr>
<td>4</td>
<td>Ladies room</td>
</tr>
<tr>
<td>5</td>
<td>Gents room</td>
</tr>
<tr>
<td>6</td>
<td>Large lecture hall with LCD</td>
</tr>
<tr>
<td>7</td>
<td>Library with reading hall</td>
</tr>
<tr>
<td>8</td>
<td>Computer lab</td>
</tr>
<tr>
<td>9</td>
<td>Experimental psychology room</td>
</tr>
<tr>
<td>10</td>
<td>Record room</td>
</tr>
<tr>
<td>11</td>
<td>Auditorium</td>
</tr>
<tr>
<td>12</td>
<td>Toilet blocks</td>
</tr>
<tr>
<td>13</td>
<td>Drinking water with cooler</td>
</tr>
<tr>
<td>14</td>
<td>Canteen</td>
</tr>
<tr>
<td>15</td>
<td>Gymkhana</td>
</tr>
<tr>
<td>16</td>
<td>Playground</td>
</tr>
<tr>
<td>17</td>
<td>Verandah</td>
</tr>
<tr>
<td>18</td>
<td>Teaching aids room</td>
</tr>
<tr>
<td>19</td>
<td>Garden or plant pots</td>
</tr>
<tr>
<td>20</td>
<td>Overall grade: A/B/C</td>
</tr>
</tbody>
</table>

Above list clarifies that a total of 20 items included in Observation Check List are based on Infrastructure of BEd Colleges.

The aspects like ventilation, lighting and cleanliness maintained in the college, provision of facilities and work profile are already included in the Job Satisfaction Scale. Hence to avoid repetition, they are not included in above check list.

**Tool (3): Interview**

Opinions of Teacher educators based on the following points were taken by means of informal and structured interview:

<table>
<thead>
<tr>
<th>No</th>
<th>Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Satisfaction with the job</td>
</tr>
<tr>
<td>2</td>
<td>Rapport with authorities</td>
</tr>
<tr>
<td>3</td>
<td>Satisfaction with pay package</td>
</tr>
<tr>
<td>4</td>
<td>Job security</td>
</tr>
</tbody>
</table>
5 Satisfaction with Orientation Course
6 Scope for special skill
7 A tendency to change the college and joining some other with better prospects.

While having an informal talk with teacher educators in various BEd colleges, on the visit for data collection, researcher asked the questions related to above mentioned seven aspects and noted down their opinions/ views / experiences. The independent factors considered for interview were Type of College and Gender.

**Table: III (1)**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Type of Tool</th>
<th>Number of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Questionnaire:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Demographic Information</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Job satisfaction Scale</td>
<td>81</td>
</tr>
<tr>
<td>2</td>
<td>Observation (Infrastructure)</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>Interview</td>
<td>07</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td><strong>118</strong></td>
</tr>
</tbody>
</table>

**Table: III (1)** clarifies that a total of 118 items were framed by the researcher in three tools viz- Questionnaire, Observation Check List and Interview. She administered these tools to the expert-advisors for content validation.

**Method of application of the Tools:**

After taking prior permission of the Principal of the colleges, researcher administered all the three tools made for pilot study and approached the respondents. The main purpose of pilot study was to refine the tools with respect to content and consistency of results. Different types of scales were used in these tools.

**Scale used for Questionnaire:**

To determine the content validity of Questionnaire, Three Point Likert Scale was used (**Appendix: A and B**). It is given as follows:

```
Most Appropriate  Appropriate  Least Appropriate
(MA)              (A)          (LA)
```
The intention to use this kind of scale was, to know whether the item framed, is testing particular factor on which it is based. In other words, researcher asked the respondents (expert-advisors) to put (√) against the alternative (MA), if they think that the item framed is most appropriate and it is testing particular sub-factor. On the other hand, if they think that the item does not reflect particular sub-factor related to job satisfaction, then they were asked to put (√) against the alternative (LA). And the middle category was appropriate (A). It was decided that when more than 6 experts-advisors out of 10, selected the alternative (MA), those items were retained in the final tool and all others were discarded.

Scale used for Observation Check List:

For use of the tool 'Observation Check List', (related to infrastructure of BEd college), since the items in the check list were as per the norms prescribed by University of Mumbai, it was not necessary to find out its content validity. Hence it was filled up by the researcher by putting (√) or (x) against each item.

The aspects considered to assign the grades (A/B/C) to BEd colleges were- Ambience of the college and Size of the rooms.

Scale used for the tool Interview:

For the tool 'Interview', Yes/No scale was used.

After making the tools along with coding or scoring key, next task was to select the experts for making the tools valid in relation to content and then approach teacher educators to administer final (content validated tools) for determining their reliability.

3.5 Sampling for pilot study:

For collecting the data for determining content validity of the tools, **Purposive Sampling (Judgmental /Selective/Subjective) method** was used because…

(i) Researcher got freedom to rely on her own judgment while choosing the members of population to participate in the study.
(ii) It is non-probability sampling method and it saved the time and money of the researcher. In other words, it is one of the most cost-effective and time-effective sampling method hence was adopted.

(iii) It is effective when only limited number of people can serve as source of data and pilot study is based on limited sample size.

With an intention to find out 'content validity' of the test items in the tools (Questionnaire and Interview), experts from the field of Psychology, Education and Statistics were approached.

The reasons for selecting expert-advisors from these three different faculties are as given below:

(i) Though researcher has enrolled herself under the faculty of Education, the topic in hand is highly correlated to Psychology. The very concept of 'Job Satisfaction' is related to mind set of a person and emotional life of teacher educators. Again it is a well-known fact that psychologists have been developing Job Satisfaction Scales for years together. They are well-acquainted with the process of their standardization, hence professors teaching Psychology having thorough knowledge of designing psychological tools, validating them & finding their reliability coefficient were chosen as expert-advisors. Hence two professors teaching Psychology were thought to be proper to validate the scales content-wise.

(ii) After collection of data, the next obvious step is ‘analysis of data’ by application of statistic most suitable to test the hypotheses of the research. So, it was thought to take advice of two professors teaching Statistics at higher level to know the compatibility of tools for further analysis.
Since the topic of research is related to the field of education, BEd colleges in particular, inclusion of BEd college professors was quite obvious as they are well aware of the work profile, overall conditions of BEd colleges existing in University of Mumbai and various factors associated with job satisfaction of teacher educators. They are also well acquainted with the attitude and expectations of teacher educators working in aided and unaided BEd colleges, so five professors from BEd colleges, who were also the guides for PhD scholars, were approached to be the expert-advisors. Out of these five, three were from aided BEd colleges whereas two from unaided BEd colleges.

Last but not the least is the Guide of present research, under whose advice whole research proceedings have been finalized.

<table>
<thead>
<tr>
<th>Sr No.</th>
<th>Faculty</th>
<th>No. of Expert-Advisors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Psychology</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Statistics</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Education</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Research Guide</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>

Thus, a total of ten experts helped in validating the items included in all the tools. On the basis of their guidance and valuable suggestions, researcher either deleted or reframed some of the items and made modifications in the tools.

All the expert-advisors unanimously advised to make the tools very compact and concise knowing the time constraint on the part of teacher educators.

3.6 Establishment of Content Validity and Reliability of the tools: First and foremost task was to establish 'content validity' of all the three tools. Here at this juncture, researcher needs to clarify the concept of 'content validity' in short.
3.6.1 Concept of Content Validity of tools:

(i) As given in researchcollegeboard.org, content validity addresses the match between test questions and the content or subject area they are intended to assess.

(ii) According to Hayncs et al (1995), content validity is the extent to which elements within a measurement procedure are relevant and representative of the construct that they will be used to measure.

(iii) As given in Wikipedia, content validity is an extent or degree to which the elements of an assessment instrument are relevant to and representative of the targeted construct for a particular assessment purpose. Ex- as regards Psychological constructs, like fatigue, achievement, stress etc., element of subjectivity in understanding the concept is ought to develop. Hence the agreement about the meaning of item related to personality trait or abstract construct by the respondents advocates high content validity.

(iv) In order to decide whether the given item is valid with respect to content, opinions of subject-experts are very valuable. They assess every item from the scale carefully and give their judgment about the validity of the item content-wise. In other words, experts decide whether the content of the item is appropriate to test the factor in hand.

(v) A very simple method of deciding the content validity of any item in the test has been proposed by C. H. Lawshe (1975). According to him, when more than half the experts from the selected panel indicated that an item is essential and hence appropriate for inclusion in the test, such items are retained. He developed a formula.…

\[
\text{CVR} = \frac{(n_e - N/2)}{(N/2)}
\]

Where,

- CVR = Content Validity Ratio
- \(n_e\) = number of subject expert panelists indicating the item as ‘essential or appropriate’.
- \(N\) = Total number of subject expert panelists.
• This formula gives values ranging from -1 to +1. Positive value indicates that more than half of the panelists have rated the item as 'essential or appropriate' and hence worth retaining.

• The mean CVR across the items is considered as an indicator of content validity of a test.

• When less than half give the response 'essential or appropriate' the value of CVR is negative.

• When half say it as 'essential or appropriate' the value of CVR is zero.

3.6.2 Concept of Reliability of the tools:
After establishing content validity, the next task was to determine the reliability of the scale.

(i) As given in uni.edu > chfasoa > reliability, reliability is the degree to which an assessment tool produces stable and consistent results.

(ii) As regards psychological research, reliability of a tool signifies its consistency in terms of their responses.

(iii) When the findings from the research are consistently replicated, the test item is said to be reliable.

(iv) Correlation coefficient is found out to assess reliability. A reliable test gives high positive correlation coefficient.

(v) In social sciences like Psychology, it is highly unrealistic to get exactly the same responses in multiple applications but high positive correlation is an indication of reliability of a test.

(vi) Two types of reliabilities are- (a) Internal and (b) External

   Internal reliability refers to the consistency of results of each item in the test, whereas external reliability refers to the extent to which a measure varies from one use to another.

(vii) Both, internal & external consistency are found out to know the reliability coefficient of psychometric tests.

(viii) Researcher wishes to highlight three types of reliability tests here, they are: Split half test, Test-retest, Inter-rater test and Cronbach’s alpha.
(ix) **Split-half test** is used to measure internal consistency of a test. It measures an extent to which all the parts of the test contribute equally to what is being measured.

(x) To test external consistency, **Test-retest and Inter-rater test** are used. Test-retest method of reliability measures stability of a test over time and Inter-rater test measures the degree to which different raters give consistent estimates of the same behaviour. Test-retest reliability coefficient is a measure of reliability obtained by administering the same test twice over a period of time to a group of individuals.

(xi) Since **Split-half test** compares the results of two halves of the same test, it becomes mandatory to make two halves of the same test. One of the most commonly used method of making these halves is to take even and odd numbered test items. If these two halves provide comparable results, then the test is said to possess internal reliability.

(xii) **Cronbach’s Alpha (α): To determine reliability coefficient of JSS**

- It is a measure of internal consistency of the test that indicates how closely a set of items are, as a group.
- It is the simplest statistical tool as compared to test-retest and parallel or equivalent form of reliability as it estimates the consistency of the items when the test is administered to a particular set of respondents on single occasion under particular conditions and used for specific purpose.
- Like Test-Retest method, it does not require administration of the test twice, at different times and calculation of coefficient of correlation between two tests. It also does not require administration of two equivalent or parallel forms of the test and calculation of correlation between the scores of two tests. So it is easy to apply Cronbach’s Alpha as it does not require tedious calculation.
- It is considered as a measure of scale reliability.

\[
\text{Cronbach’s Alpha (α) = } K \bar{e} / [ \bar{e} + (k-1) \bar{e} ]
\]

where,
The value of ‘α’ indicates the percentage of reliable variance. For example, if $\alpha = 0.8$, then it indicates that 80% of the variance in the scores is reliable variance. It means that, 20% is error variance.

- $\alpha = 0$, when no variance is consistent.
- $\alpha = 1$, when all variance is consistent.

After clarifying the concepts of content validity and reliability of the tools, the next task was to actually administer the tools to the sample selected for pilot study.

Thus, after selecting the expert-advisors and getting their willingness to help the researcher, tools were given to them. As per their responses, researcher determined the content validity of each of the items in Questionnaire. The items invalid with respect to content were discarded, whereas some of the items were reworded.

Content validated questionnaire was administered to the sample selected for pilot study to determine its reliability coefficient. After confirming its reliability, it was thought to be ready for final administration. The items in the tools, Interview and Observation were unanimously accepted by the expert panel, hence thought to be valid with respect to content. They were administered directly to the final sample.

Thus, after clarifying the process conducted to get valid and reliable tools, and their administration for pilot and final study, researcher wishes to illustrate the plan for analyzing raw data that was collected with the help of three tools.

3.7 Plan of Statistical Tools used for Analysis of raw data:
Researcher planned for the statistical procedures to be followed for analyzing the data to achieve particular purpose. The scheme of the same is given as follow:

Table: III (3)

Plan of Statistical Tools used for Analyzing Raw Data

<table>
<thead>
<tr>
<th>Sr No.</th>
<th>Statistical Tool</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Content Validity Ratio by Lawshe C.H.</td>
<td>To establish content validity of Job Satisfaction Scale.(JSS )</td>
</tr>
<tr>
<td>2</td>
<td>Cronbach's alpha</td>
<td>To establish reliability of JSS</td>
</tr>
<tr>
<td>3</td>
<td>Pearson Chi-square test</td>
<td>To test Null Hypotheses</td>
</tr>
<tr>
<td>4</td>
<td>Percentage with graphical representation</td>
<td>To check magnitude and direction of responses in JSS</td>
</tr>
<tr>
<td>5</td>
<td>Mann- Whitney U-test (Non-parametric equivalent to t-test )</td>
<td>To compare population means of the tools- Interview and Observation</td>
</tr>
<tr>
<td>6</td>
<td>Factor Analysis</td>
<td>To explore the factor loadings and group the sub-factors (from JSS) with similar behaviour</td>
</tr>
</tbody>
</table>

Before entering the data of pilot and final study in excel, 'coding' of responses in the form of numbers ranging from 1 to 5 was done and then the raw data was analyzed by using SPSS software. Coding strategy has been given at the end of this chapter.

3.7.1 Concept of Chi-square analysis:

Pearson Chi-square test was used to find out p-value, which was considered as the basis for accepting or rejecting null hypothesis.

(i) Chi-Square is a non-parametric statistic, also called as a distribution-free statistic.

(ii) It is the most useful statistic, for testing hypothesis when variables are nominal or ordinal.

(iii) It provides the information related to the significance of any observed differences and the categories that account for these differences.
Thus, observed frequencies are compared with expected frequencies, by using following formula for chi-square or p-value.

\[
p-value = \frac{(O-E)^2}{E} = \frac{M_r \times M_c}{n}
\]

Where,
- \( O \) = Observed frequency
- \( E \) = Expected frequency
- \( M_r \) = Row marginal for the cell
- \( M_c \) = Column marginal for the cell
- \( n \) = Number of observations

As with any other statistical tool, use of chi-square test is also based on certain assumptions.

**Assumptions for using Chi-square test:**

(i) The data in the cells should be frequencies or counts of cases.
(ii) The levels or categories of the variables are mutually exclusive.
(iii) Each subject may contribute data to one and only one cell.
(iv) Both, the dependent and independent variables are giving categorical data.
(v) Control variables are zero.
(vi) Chi-square is used when researcher needs to find out whether there exist differences between the groups.

After clarifying the concept of Chi-square and its application, the raw data was subjected to this statistical tool. The p-values obtained were tested at 0.05 level of significance.

(i) p-value < 0.05, was considered as significant, rejecting null hypothesis.
(ii) p-value > 0.05, was considered as non-significant, accepting null hypothesis.
(iii) When null hypothesis was rejected, it was concluded that the factor under consideration is significantly associated with job satisfaction.
(iv) When null hypothesis was accepted, it was concluded that the factor
under consideration is not significantly associated with job satisfaction.

After testing null hypotheses, the next task was to take into account various categories under each independent factor. Ex- Type of college has two categories- (Aided and Unaided), Under Status of the job- (Permanent, Temporary, Adhoc and On Probation), are the four categories.

Thus, there are 1-5 sub-categories under each of the six independent factors, viz

\[
\begin{align*}
&\text{(i) Type of college} & \text{(iv) Status of the job} \\
&\text{(ii) Gender} & \text{(v) Pay Package} \\
&\text{(iii) Qualification} & \text{(vi) Teaching Experience.} \\
\end{align*}
\]

In order to find out the level of job satisfaction in relation to all the independent factors, it was mandatory to consider sub-categories under each of these factors.

(Note: All the independent factors mentioned in Flow Chart: III (3) were not considered. Only the six independent factors mentioned above were focused due to a confusing response of the respondents related to the deleted independent factors.)

3.7.2 Concept of Percentage Analysis:

Though percentage is a simplest and easiest way of representing raw data, it is very useful statistical tool to make the data more comprehensive, especially when two or more parameters are of unequal size. Ex- Size of male and female in the given population, size of aided and unaided colleges in the sample, teaching experience of the respondents in five categories…. etc.

In that case, it is necessary to make the base 100 and compare the two parameters. So for present research along with inferential statistic, researcher has given more emphasis on percentage analysis as it could give the information related to the magnitude and direction of the responses considered under each of the sub-categories of independent factors.

So researcher thought it very essential to give more weightage to percentage analysis. Again, the percentages given in tabular form could not help in comparison of the responses in two or more categories related to particular factors at a glance. Hence researcher felt the need to represent the percentages in graphical form and joint bar
diagrams (horizontal type) were drawn. It simplified the process of drawing conclusions.

Thus researcher dropped an idea of tabular representation of percentages, instead she gave more emphasis on self-explanatory graphical representations.

### 3.7.3 Concept of Factors Analysis:

In order to club together the factors showing similar behaviour (in terms of responses of respondents), to explore a new pattern of Six-Factor-Cascade-Model of Job Satisfaction and to confirm its compatibility, factor analysis was done. The concept of Factor Analysis is as given below:

(i) **A Factor** is a group of observed variables showing similar pattern of response. The factor in hand is associated with a variable that cannot be measured directly. Hence the factors are enlisted on the basis of factor loadings. They explain the amount of variation in the data.

(ii) Factor Analysis is an explorative analysis in which similar variables or factors are grouped together. Due to its explorative nature it does not differentiate between independent and dependent variables. Since it is an extremely complicated process, it is done with the help of software.

(iii) It condenses the information in a model by reducing the dimension of the observations, thus making the data simple and understandable.

(iv) It is a very effective tool to interpret the results of observation when a large number of decision variables is grouped into smaller set of factors or modules.

(v) It finds out hidden pattern, shows their overlapping and also reveals the characteristics in multiple patterns.

(vi) It creates the sets of variables (dimensions) for the similar items present in the sets.

(vii) Similar factors are extracted and grouped together by rotating them.
(viii) Factor analysis is used when the data contains large number of observed variables that are thought to be reflecting smaller number of latent or underlying variables.

(ix) The variable having highest correlation value with particular factor is said to have strong association. Thus factor loadings are interpreted just like standardized regression coefficient.

(x) The **Kaiser Meyer Olkin test** checks whether the data in hand is suitable for factor analysis.

(xi) Factor loadings are similar to correlation coefficients and range between -1 to 1.

(xii) Closer the factors have the value between -1 to 1, the more they affect the variable.

(xiii) Factor loading of ‘zero’ indicates no effect.

(xiv) Two types of Factor Analysis (FA) can be used- Confirmatory FA and Exploratory FA

(xv) **Confirmatory FA** is used when one wishes to test the hypothesis. In that case researcher already has an idea about how his model looks like.

(xvi) **Exploratory FA** is used when one wishes to explore the pattern of model. Thus it throws light on the optimum number of factors required to represent the sets of data. So, it can generate a large number of possible models for the given data.

(xvii) Factor analysis is used in Psychometrics, personality theories, product management, operation research, marketing, psychological studies, and finding socio-economic status.

3.7.4 Concept of Mann-Whitney U-Test:

Mann-Whitney U-test is used to analyze the data related to the tools Observation and Interview.

As mentioned earlier, data related to infrastructure was collected by means of Observation Check List. The independent factor considered was Type of college (Aided/Unaided) whereas for the tool ‘Interview’ the independent factors considered were Type of college and Gender.
In order to analyze the data related to these two tools, Mann-Whitney U-test was found to be the most appropriate statistical tool because 

(i) ....it is non-parametric test.
(ii) ....it compares two sample means coming from same population.
(iii) ....it is an alternative method to t-test when the data is having ordinal scale.
(iv) ....medians of two populations can also be compared with this test.
(v) ....it assumes mutual independence and independence within the samples.

The formula for Mann Whitney U-test

\[
U = n_1 n_2 + n_2 (n_2 + 1) - \sum_{j=1}^{n_1} R_j
\]

Where,
- \(U\) = Mann-Whitney U-test
- \(n_1\) = Sample size one
- \(n_2\) = Sample size two
- \(R_i\) = Rank of the sample size

3.8 Criteria for retaining the test items in the tools:

(i) Questionnaire: (Job Satisfaction Scale)

- The criteria used for selecting or retaining particular item in Job Satisfaction Scale was that – 'when more than 6 (out of 10) experts ticked (✓) the response (MA), i.e. 'Most Appropriate', the item was retained. Further, the suggestions given by them were scrutinized and valid suggestions were accepted. Some of the items were modified accordingly.
- Thus out of 91 items from Job Satisfaction Scale, only 45 items were thought as valid with respect to content, and hence were retained in the final scale. Some of them were reworded.
- Thus CVR (Content Validity Ratio) values for all the 91 items in the JSS were computed and the items giving the values of CVR ranging between 0.4 to1 were selected.
• Then the 'content validity Ratio' of all these selected items was found out by finding their average. **CVR (Content Validity Ratio) of Job Satisfaction Scale was found to be (0.66).** This content validated scale was used for final study.

• Thirty-six items based on dependent factors out of 81 were retained and all the 10 items based on independent factors were retained in the final Job Satisfaction Scale.

(ii) **Observation Check List: (Observation of Infrastructure)**
For the tool, Observation, the items were taken from the list of infrastructure prepared by University of Mumbai. Hence all the 20 items were retained and no question of finding Content Validity Index was realized. Hence, all the items were accepted by the expert panel.

(iii) **Interview:** Items in this tool were restricted to 7 only. They were also agreed upon by all the experts unanimously.

Thus, all the three the content-validated tools were ready for administration to the sample in order to determine their reliability coefficient. The strength of items retained on the basis of content validity ratio is as given below:

<table>
<thead>
<tr>
<th>Sr No.</th>
<th>Tools</th>
<th>No. of Items in Pilot Tools</th>
<th>No. of Items in Final Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Questionnaire</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Demographic Information</td>
<td>10</td>
<td>09</td>
<td></td>
</tr>
<tr>
<td>b. Job Satisfaction Scale</td>
<td>81</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Observation (Infrastructure)</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>Interview</td>
<td>07</td>
<td>07</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>118</td>
<td>72</td>
</tr>
</tbody>
</table>

**Table: III (4)**

Table: III (4), clarifies that approx 61 % (72 out of 118) of the items from the tools of pilot study were retained in the final tools, thus making the tools compact and concise. These tools were valid with respect to content and were ready for finding out reliability coefficient of the items.
Sample size selected for pilot study is given in Table: III (5). It has clarified the type and number of BEd colleges along with the strength of teacher educators in it.

Table: III (5)
Sample Size for Pilot Study

<table>
<thead>
<tr>
<th>Sr No.</th>
<th>Type of College</th>
<th>Number of Colleges</th>
<th>No. of teacher educators</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aided</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>Unaided</td>
<td>5</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>7</strong></td>
<td><strong>37</strong></td>
</tr>
</tbody>
</table>

(i) After administering the tools to 37 teacher educators, the raw data was subjected to the statistic, Cronbach’s Alpha (∝). It was found out using SPSS software. The value of Cronbach’s alpha for the Job Satisfaction Scale was found to be 0.629

(ii) Statistically, 0.7-0.8 value of (∝) is considered as acceptable. But for psychological constructs, the value little below 0.7 is also considered as acceptable. Thus the value of (∝) = 0.629 was accepted and the reliable tool was ready for administration to the final sample.

(iii) The final compact and concise tools, viz: (1) Job Satisfaction Scale (45 items), (2) Observation Scale (20 items) and (3) Interview scale (7 items) were administrated to the teacher educators from BEd colleges of University of Mumbai.

The raw data was entered in excel, in the form of numerical codes and analyzed further by using SPSS software.

3.9 Design of Final Study:

After making the tools valid with respect to content and reliable with respect to consistency of results, they were administered to the sample selected for final study.

3.9.1 Sampling Procedure for Final Study: (Census sampling)
Knowing the fact that there are only 81 BEd colleges (Aided+ Unaided), with an average of 4-6 teacher educators in each of them, it was possible to get maximum of 320-480 sample size (in the academic year 2015-2016).

In order to have a sizeable sample, from amongst various methods of sampling like Random, Stratified Random, Cluster, Quota, Snowball, Systematic, Judgmental, Accidental, Census etc., Census method of sampling was thought to be the most appropriate, thus selecting the whole population of the teacher educators working in BEd colleges affiliated to University of Mumbai for data collection.

The list of BEd colleges collected from University of Mumbai has enlisted 87 BEd Colleges. Their area-wise distribution is as given below:

<table>
<thead>
<tr>
<th>Sr No.</th>
<th>Area</th>
<th>Number of BEd Colleges</th>
<th>Total No. of Colleges</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Western Mumbai</td>
<td>9 Aided, 16 Unaided</td>
<td>25</td>
</tr>
<tr>
<td>2</td>
<td>Central Mumbai</td>
<td>1 Aided, 33 Unaided</td>
<td>34</td>
</tr>
<tr>
<td>3</td>
<td>Harbour</td>
<td>2 Aided, 02 Unaided</td>
<td>04</td>
</tr>
<tr>
<td>4</td>
<td>Trans- harbour</td>
<td>0 Aided, 09 Unaided</td>
<td>09</td>
</tr>
<tr>
<td>5</td>
<td>Sindhudurg</td>
<td>0 Aided, 03 Unaided</td>
<td>03</td>
</tr>
<tr>
<td>6</td>
<td>Ratnagiri</td>
<td>1 Aided, 05 Unaided</td>
<td>06</td>
</tr>
<tr>
<td>7</td>
<td>Raigad</td>
<td>0 Aided, 06 Unaided</td>
<td>06</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>13 Aided, 74 Unaided</strong></td>
<td><strong>87</strong></td>
</tr>
</tbody>
</table>

Table: III (6) indicates that out of 87 BEd colleges only 13 are aided, whereas remaining 74 are unaided ones.

Researcher had further delimited the research to only General BEd colleges i.e. those imparting training to teach at secondary and higher secondary level. So she excluded the colleges, which offered training course for physical education, special education, early childhood and mentally handicap. She had purposely excluded the training imparted in these special category training colleges because their syllabus, exposure and training pattern is totally different as compared to those getting trained to teach the secondary school and junior college.
There are only 6 colleges that are offering teacher training course for special category children. They were excluded from the sample and researcher focused present study only on 81 BEd colleges (12 Aided and 69 Unaided) for data collection. She approached these colleges either personally or by using postal service. By keeping follow-up schedule with the colleges she visited many colleges twice, first time to give the tools and second time to collect the filled up tools by the teacher educators.

Finally, researcher could collect the responses from 397 teacher educators, as she had given self addressed stamped envelopes and postage along with the tools that were delivered by post. Thus in a span of 3-4 months, researcher could collect the data successfully.

Researcher could use the tools of 'Interview of teacher educators' and 'Observation Check List' only in those colleges, which she had visited personally. However, she posted 'Structured Interview' and 'Observation Check List' to the colleges which she could not visit personally.

3.9.2 Tool-wise collection of data:

Table: III (7)

<table>
<thead>
<tr>
<th>Sr No.</th>
<th>Tool</th>
<th>Sample Size of Teacher Educators/BEd Colleges</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Aided college</td>
</tr>
<tr>
<td>1</td>
<td>Job Satisfaction Scale</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>(sample- teacher educators)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Observation</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>(sample- colleges)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Interview</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>(sample- teacher educators)</td>
<td></td>
</tr>
</tbody>
</table>

Table: III (8)
Tool-wise Sample Size of Male and Female Teacher Educators

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Tools</th>
<th>Sample Size of Teacher Educators</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>1</td>
<td>JSS</td>
<td>56</td>
</tr>
<tr>
<td>2</td>
<td>Interview</td>
<td>23</td>
</tr>
</tbody>
</table>

After getting astonishingly abundant response from the teacher educators of all the BEd colleges, the next most important task was to analyze the data.

Researcher at this stage wishes to give a coding system used to convert the responses suitable for the purpose of analysis. Coding system and Scoring key followed for the categories related to various dependent and independent factors is as given below:

Table: III (9)

Coding of Categories related to various Independent Factors in Job Satisfaction Scale (Final Study)

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Independent Factors with Categories</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Type of College</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aided</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Unaided</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td><strong>Qualification</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Master Degree + M.Ed</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>MPhil</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>PhD</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>NET/SET</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td><strong>Status of the Job</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Permanent</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Temporary</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Adhoc</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>On probation</td>
<td>4</td>
</tr>
<tr>
<td>Sr. No</td>
<td>Responses</td>
<td>Scores</td>
</tr>
<tr>
<td>--------</td>
<td>-----------</td>
<td>--------</td>
</tr>
<tr>
<td>1</td>
<td>Job Satisfaction Scale</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Agree</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Undecided</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Disagree</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Strongly Disagree</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Observation and Interview</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Grade for Infrastructure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Good</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Fair</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Poor</td>
<td>1</td>
</tr>
</tbody>
</table>

After clarifying the coding system used to enter the raw data related to independent factors/demographic information in Excel, the next task is to give a scoring key used to assign scores to the responses given by the respondents for the items in the tools.
Researcher took advice of expert statisticians to analyze the data collected from teacher educators. She used **SPSS** (Statistical Packages for Social Sciences) and **Excel** software to apply Descriptive and Inferential Statistics, whereas **Corel Draw** software was used to draw the diagrams/models. The details of the same are given in **Chapter IV**.