Chapter-3
Research Methodology

3.1.0 Introduction

The study of any subject essentially includes structured methodology. Structured methodology facilitates the readers to assimilate the contents in a comfortable way. Any report follows systematic approach to present the contents. Written presentations insist for a systematic, cohesive and continuous presentation of the material included in the study. Present study is essentially, focused on to the two distinct aspects namely; Professional Competency and Professional Ethics. However the chapter dealing with procedural aspects emerges as the natural flow of preceding observations. In other words, after dealing with the introductory preliminaries in Chapter-1 and then, reviewing the literature, in (Chapter-2), in the previous chapter, presentation now proceeds to consider various aspects of the methodology. This chapter includes the description of the research method, research design, identification of the relevant population and thereafter the sampling procedures, actual sample together with the sampling procedure, different tools, tool development and statistical techniques etc. used in this study. It is essential to consider the heart of the study that is the rational of the study to begin with and it is presented in the following paragraphs.

3.1.1 Rationale of the study

Review of related literature motivates the investigator to look critically into certain areas of study for further research. Professional Competency in relation to Professional Ethics of both Pre and In-Service teachers is one such area for study. Though various studies were conducted in the related field one can always find some research gaps meriting a research study. More specifically the Professional Competency of a teacher is an area which deserves to be probed from different perspectives. Further, when the teachers’ Professional Competency is viewed from the teachers’ Professional Ethics point of view it
encourages the researcher to find the interrelations, if any, between these two aspects, namely teachers Professional Competency and teachers Professional Ethics.

Teacher is considered as a learning facilitator. Besides imparting knowledge, skills teacher makes every effort to develop right attitudes, and values in the learner. This remains continuous in teaching learning process. In the era of knowledge explosion and its availability everywhere on finger tips it becomes a natural imperative for any teacher to continuously update and upgrade his or her own professional capabilities. Besides, knowledge explosion and technology down pour and its integration with the educational process is fast emerging. Open Educational Resources have become enriching as well as handy to one and all. Technocracy is inspiring, facilitating and motivating the current generation of learners. These learners are handling lots of useful knowledge with their fingertips, by employing internet and many technology based gadgets and facilities. However, despite all the technological facilitation it is undisputable that teacher with his or her competencies and ethics is a must. No one can ignore the role of a teacher in the educational process. Most essential lively human element in the process of learning is the teacher, besides the learner. The value inculcation process with the required human touch in the contemporary learner is possible only through the teacher. Preparing the student of the day for sustenance, survival and advancement is not a child’s play. It calls for an omnipotent teacher. In other words today’s society requires a teacher with plethora of competencies. There is an acute need of enhanced teacher efficiencies in their professional practice. This ensures a better teacher performance in the process of teaching learning. A single competency is not the solution, whereas the teacher needs a plethora of merits performing collectively and synergically, promoting the best possible teaching competency, while practicing the profession. This may include instructional competences, organization competences, evaluative competencies, language and communication competencies, technology related competencies etc. A Teacher who desires to be successful and effective in his or her professional endeavor needs to effort continuously and enhance their set of Professional Competencies.

In other words, a person in the field of teaching essentially, is a social architect, who slowly and steadily builds and develops a harmonious and enlightened learned society.
Teacher remains synonymous to the light enlightening the other light. Therefore it is the fundamental requirement of any country that it offers utmost importance and highest effort in producing the best and competent teachers. To do so, it is necessary to provide sufficient opportunities to both the teachers as well as to the teacher educators, so that they are suitably equipped with the Professional Competences together with the required Professional Ethics. This cannot remain as a static frame. On the contrary one should perceive that these aspects; namely Professional competency and the Professional ethics remain dynamic in nature and accordingly they deserve to be updated and upgraded from time to time. Such a process enhances the quality in education. This calls for the study of the Professional competency and the Professional ethics.

(Natesan, 2010). Importance of a teacher in the rapidly changing times and very special significance of a teacher is a well-known matter. This also calls for more and more competent teachers having rich wealth of appropriate ethics built-in. Any study made on the teacher’s Professional Competency and teacher’s Professional Ethics remains useful to the better understanding of today’s professional needs of the teaching community.

Having considered different issues concerning the Professional Competency and Professional Ethics of teachers belonging to Pre and In-Service groups it becomes relevant to investigate the contemporary status of the teachers in respect of their competency and ethics. Such studies augur the right identification of professional requirements, including the design of teacher’s training programs for effective educational transactions. However, one needs to address the following research questions while considering the research study in the field of Professional Competency and Professional Ethics.

### 3.1.2 Research questions

Research questions help in consolidating the emerging ideas of the research. These questions when raised effectively they pave the way to design the research and also help in choosing the research methodology. One may be guided and motivated by the earlier research in raising suitable and relevant research questions. This can happen from the
subtle research gaps observed while reviewing the earlier research. Researcher derives some useful direction and stimulation in designing the methodology with the help of pertinent research questions. This leads to finding some answers to the research questions, thus raised. In the process of research the research questions have much meaning in the very design of the study. On conclusion of the research study these research questions get answered to the extent possible. In the present investigation following questions were identified with the research concerns.

1. How is the trend of Perception of Professional Competency, Professional Competency, and Perception of Professional Ethics of Pre-Service and In-Service teachers?

2. Is there any variation in the Perception of Professional Competency, Professional Competency and Professional Ethics amongst the In-Service teachers working in different Boards?

3. Is there any gender influence in Pre and In-Service teacher’s Perception of Professional Competency, Professional Competency and Perception of Professional Ethics?

4. What is the relation between Perception Professional Competency, Professional Competency, and Perception of Professional Ethics of Pre and In-Service teachers?

5. Keeping in view of the research questions mentioned above following study was proposed for detailed investigation.
3.1.3 Statement of the problem

Having considered the rational of the study and the relevant research questions it is now required to establish the actual statement of the problem. This enables the researcher to seek greater focus of the investigation. Clear statement of the research problem helps the researcher and also the readers as well as the evaluators. Therefore and In the light of preceding perspective on the present study and considering the research problem, investigator identified the following research problem, for in-depth study. Thus the statement is presented below.

“A study of Professional Competency and Professional Ethics of Pre-Service and In-Service Teachers at Mumbai”.

3.1.4 Objectives of the study

The objectives are usually specific statements or they are particular kind of goals that contributes to the achievement of "bigger" goal. Before doing research on any problem researcher should set the objectives to complete research work successfully. Without this no researcher can reach his proposed aims. Objectives guide the researcher in pursuing the study in a systematic way. It motivates in choosing or developing the appropriate tools and using them for acquiring the relevant data for further analysis. Also the objectives help in framing the hypotheses for the required testing the same in the light of the data analyzed. Therefore the researcher has to set the objectives. For the present study following objectives were identified-

1. To find out the Perception Professional Competency, Professional Competency, and Perception of Professional Ethics of Pre-Service and In-Service teachers.
2. To develop an appropriate measuring instruments to find out Perception of Professional Competency, Professional Competency and Perception of Professional Ethics of the teachers.

3. To find out variation in Professional Competency, Perception of Professional Competency and Perception of Professional Ethics amongst the In-Service teachers from different Boards.

4. To find the gender influence, if any, on Pre and In-Service teacher’s Perception of Professional Competency, Professional Competency, and Perception of Professional Ethics of the teachers.

5. To find the relation, if any, between Perception Professional Competency, Professional Competency, and Perception of Professional Ethics of Pre and In-Service teachers.

3.1.5 Operational definition of the terms

Whenever research is undertaken, the key terms used in the study needs to be defined. This facilitates the clarity in carrying out the investigation properly. It also ensures the un-blurred persuasion of the study avoiding conceptual misinterpretations basing on the technical terms. This is done to give a concrete meaning to the variables and also to establish the references so that the researcher can approach the problem with greater clarity. The operational definition is the meaning adopted by the researcher to study the given variable. Operational definitions of the key terms enable measurability or quantification of the variable involved. It also helps to a greater extent in analyzing different parameters to draw appropriate conclusions of the study. Given below are the operational definitions of the terms involved in the present study:
A). Perception of Professional Competency

Teaching is a profession. Every profession calls for a certain Professional Competency. This implies that the teachers are professionals, and are expected to have some degree of Professional Competency. Do the Teachers themselves have their own Perception of Professional Competency? If so, how is the Perception of Professional Competency of the teachers? It may not be possible to accurately measure the teacher’s Perception of their Professional Competency. Yet one may attempt to understand the trend of teacher’s Perception of Professional Competency. For the purpose of present study the Perception of Professional Competency of the teachers remains indicated by the scores obtained on the tool TPPC.

B). Professional Competency:

Professional Competency of a teacher involves various aspects like content knowledge, its pedagogical consideration, language, communication and ICT skills etc. However, for the purpose of present study Professional Competency of the teachers was determined by the weighted summation of the scores (section-4.1.0) obtained on the following three testing tools.

B.1: Lesson Observation Tool (LOT)
B.2: Teacher’s Perception of Professional Competency (TPPC)
B3: Student’s Reflections on their Teacher’s Classroom Performance (SRTCP)

C). Teacher’s Perception of Professional Ethics:

Every profession has its own basic and profession specific ethics to be observed by the professional practitioners. Teaching being a profession and teacher being a professional the Professional Ethics in this field has its own importance. Basic values, morals and
ideals which are essential to this field deserve due honor and respect in its practice. Present study operationalizes the Perception of Professional Ethics as the scores obtained on the tool Teacher’s Perception of Professional Ethics (TPPE). In doing so it was considered that the Teacher’s Perception of Professional Ethics (TPPE) and the Professional Ethics (PE) were treated as same and represented by PPE. This was done due to the fact that no other measure was used to define Professional Ethics, separately, as it was done in the case of PPC and PC.

D). Pre-Service Teachers

Pre-Service Teachers are the students admitted into the English medium B.Ed. Colleges of Mumbai University and located at Mumbai.

E). In-Service Teachers

In-Service Teachers are the Teachers working in schools affiliated to Maharashtra State Secondary Board (Secondary School Certificate: SSC), Council for the Indian School Certificate Examinations (Indian Certificate Secondary Education: ICSE) and Central Board of Secondary Education: CBSE offering All India Secondary School Examination: AISSE, at Mumbai.

3.1.6 Assumptions

Assumptions are a kind of initial or starting beliefs over which further work is built up. It can be sometimes underestimating things so that the circumstance is improved for intelligent methodology. They simply encourage the advancement of an understanding a fractional improvement by presenting prohibitive condition. Assumption means preventive conditions before the argument can get to rational suppositions are made on the premise of legitimate understanding and their truthfulness can be seen on the basis of data or confirmations Assumptions are statements that are considered true, even though they have not been scientifically tested. Any study is likely to contain few assumptions inherently.
They can be explicit or implicit. Some understanding and clarity of the related assumptions in the study facilitates the investigation to be clear of limitations. Following assumptions have been made for the present study. Assumptions in the research study deserve to be made specific and clear as this enables the investigator to understand the peripherals of the study, like the boundary conditions. It also helps the reader to appreciate the limitations embedded in the assumptions.

1. PST and IST do possess some Perception of Professional Competency and also some Perception of Professional Ethics. They also have some level of Professional Competency. Further, it is possible to scale / grade Professional Competency and Professional Ethics qualitatively as well as quantitatively for further evaluation.

2. Questionnaire containing number of test items for finding the Perception of Professional Competency and Perception of Professional Ethics can be framed basing on some valid criteria elements.

3. It is possible to get all aggregate score on PPC, PC and PPE questionnaires over number of test items with scores aggregated scores on all test items of PPC and PPE when averaged over number of subjects’ offer the overall trends on PPC, PC and PPE. Weighted average of scores obtained on TPPC, LOT and SRTPC indicate the Professional Competency of the teachers, in the operationalized frame.

3.1.7 Variables of the study

Variables are properties or characteristics of some event, object, or person that can take on different values or amounts. Variables are things that we measure, control, or manipulate in research. The difference lies in the role they play and in the type of measures applied to them.
Dependent variables are the outcome variables and are the variables for which we apply statistics. The variable which changes on account of independent variable is known as dependent variable.

Independent variables are variables which are manipulated or controlled or changed. The classifying or attributes independent variables are the variables which cannot be manipulated but the sample can be classified accordingly.

Present investigation considered two principle variables; dependent and independent, as illustrated below.

A. Dependent Variable:
   a. Perception of Professional Competency
   b. Professional Competency
   c. Perception of Professional Ethics

B. Independent Variables:
   a. Gender
   b. Board
   c. Pre-Service Teachers Performance
   d. In-Service Teachers Performance

3.1.8 Hypothesis

A hypothesis is a preliminary or temporary explanation or proposition that is held as a hypotheses by the investigator of what the researcher considers the result of an examination will be. As it were, it is an assumption, a clever theory made by the
researcher with respect to the relationship between variables or impact of one variable on
other. The hypothesis is a powerful instrument in exploration procedure to attain to tried
and true learning. It helps the researcher to relate hypothesis to observation, and
perception to hypothesis. Consequently it predicts and clarifies the relationship between
variables. Hypotheses are quantifiable and testable. Hypotheses are of two sorts (i).
Directional or alternate hypothesis (ii). Non-directional hypothesis or Null Hypotheses.
According to George A. Lundberg (2012) “A hypothesis is a tentative generalization, the
validity of which remains to be tested. In its most elementary stage the hypothesis may be
any hunch, guess, imaginative idea, which becomes the basis for action or investigation”.

**Null-Hypotheses:** Null assumption is non – directional in nature and does not determine
the course of the distinctions or relationship among variables. As per (Sharma 2002) the
object of taking null hypothesis is to avoid personal bias of investigator during collection
of data as well as at the time of drawing conclusion. A null hypothesis expresses that there
is no significant distinction or relationship between two select parameters under
consideration. Null hypothesis can be measurably tried. Every null hypothesis is
independently tried keeping in mind the end goal to choose whether it ought to be
acknowledged or rejected. Testing of null hypothesis helps in learning whether the
observed contrast or relationship among variable emerge out of chance vacillation or not.
Hypotheses are formed so as to clarify observed truths and conditions. Hence each
hypothesis is tested individually to find out whether it is tenable or not. Accordingly, any
research study contains few hypotheses and the same are put to test in the course of the
study. Keeping in view of the objectives of the present study following null hypothesis
were made:

**H₀¹.** “There exists no significant difference between Professional Competency,
Perception of Professional Competency and Professional Ethics of Pre-Service and In-
Service teachers”.

**H₀².** “There exists no significant difference between Professional Competency,
Perception of Professional Competency and Professional Ethics amongst the teachers
from different Boards of study”.
H₀₃. “There exists no significant difference between Professional Competency, Perception of Professional Competency and Professional Ethics amongst male and female teachers”.

H₀₄. “There exists no significant relation between Professional Competency, Perception of Professional Competency and Professional Ethics”.

3.1.9 Scope and limitations of the study

Any research study remains contained by some scope together with certain limitations. Limitations are likely to arise due to resource limitations, time and cost etc. parameters. Present study has its scope ranging from Perception of Professional Competency, to Professional Competency and then to the Perception of Professional Ethics. However these key elements of the present study were mainly considered from the educational practice at secondary level. On the other hand the study was delimited to certain aspects as presented below. Resource limitations, including costs involved in the study called for some restrictions in limiting the size of the sample.

1. The present study was delimited to the Pre-Service and In-Service teachers at secondary level and working at Mumbai.

2. The study was delimited to In-Service teachers working in the English medium secondary schools affiliated to any one of three boards; namely, Maharashtra State Secondary Board (Secondary School Certificate: SSC), Council for the Indian School Certificate Examinations (Indian Certificate Secondary Education: ICSE) and Central Board of Secondary Education: CBSE offering All India Secondary School Examination: AISSE, at Mumbai.
3. The Present study was restricted to the Pre-Service teachers studying at English medium B.Ed. colleges affiliated to Mumbai University.

4. The investigation was essentially delimited to the Perception of Professional Competency, Professional Competency and Professional Ethics of the Pre-Service teachers and In-Service teachers.

5. The present study is restricted to Greater Mumbai only.

3.1.10 Data required for study

To achieve the objectives stated (section 3.1.3) earlier the present study required the following data. It was collected by the researcher personally by administering the tools on the defined sample also by personal observation and interviewing the subjects.

1. PPC scores from IST and PST
2. PPE Scores from IST and PST
3. LOT Scores from IST and PST
4. General information of the sample, like, gender, Board affiliation.
5. SRTCP Scores from secondary students.
6. Principals reflections on PPC, PC and PPE in their Interview
3.1.11 Sources of data

The data required for the present study, as mentioned above, was available from different sources, as listed below.

1. Students admitted into the English medium B.Ed. Colleges located in Mumbai and affiliated to Mumbai University. This data was to meet the requirements of Pre-Service teachers’ reflections on the administered tools.

2. The Teachers working in schools affiliated to Maharashtra State Secondary Board (Secondary School Certificate: SSC), Council for the Indian School Certificate Examinations (Indian Certificate Secondary Education: ICSE) and Central Board of Secondary Education: CBSE offering All India Secondary School Examination: AISSE, at Mumbai. The data obtained from these groups of sample on the administered tools was to meet the requirements of the stated objectives.

3. Students of different classes of secondary section in selected secondary schools. Student’s responses on their teachers was obtained and combined with other variables during the data analysis, as per the requirements of the objectives.

4. Principals of selected secondary schools. Open ended interview based data was obtained for necessary analysis of the data.

3.2.0 Research design

Research design explains the entire plan of the study in detail. It includes a detailed description of the tools used for collecting information, sample, methodology of the study and the methods used for data analysis. Research design refers to the structure of an enquiry planned to show the path for effective completion of the study undertaken. It is
the detailed description of a proposed study design to investigate given problem. The research design is a theoretical structure within which research is conducted. It constitutes a sort of plan for the collection, measurement and analysis of data. It is needed because it makes research as efficient as possible yielding maximum result with the minimum of time, efforts and money. Preparation of a research design becomes important as soon as the research problem has been defined. A careful design of planning enables the researcher to do work in a systematic manner. It helps the researcher to organize the ideas in such a way where in it will be possible for the researcher to look for flaws and inadequacies. Research design guides the researcher to keep the right direction. Thus research design is essential for imparting rational approach to the study. A diagrammatic presentation of the research design concisely depicts different aspects of the research pictorially. Thus one can choose to depict the research design in a diagrammatic way also. It is a stepwise, logical and systematic activity. A research design includes following components:

a. Research Methods
b. Sampling Design
c. Tools for the research
d. Statistical Techniques used for data analysis

Kerlinger (1964) opines: “Adequately planned and executed design helps greatly in permitting us to rely on both our observation and our inference.” An architect prepares a blue print before he approves a construction similarly a researcher makes a plan before she undertakes her research work. This helps researcher to save time and resource. Such a plan or blue print for the study, known as a research design remains an essential element of any research study. Research design indicates a plan of action to be carried out in connection with a proposed research work. It provides only guidelines for the researcher to enable her to keep track of her action and know that she is moving in the right direction in order to achieve her goal. The research design of present investigation was visualized and depicted pictorially here
Figure 3.1 Research Design

Professional Competency

PPC
LOT
SRTCP

PST Male
PST Female

IST Male SSC
IST Female SSC
IST Male ICSE
IST Female ICSE
IST Male CBSE
IST Female CBSE

Perception of Professional Ethics
3.3.0 Research methodology

Research study calls for a systematic procedure to be followed. It involves a logical and scientific way of approach in addressing different aspects involved in the study. The very essence of the research method is a scientific way of approach at every stage of research study. Therefore research methods are very important in a research process. For addressing any research problem, the research methods describe the various steps of the plan. According to Webster’s Dictionary (1970) “Methods indicate systematic way of procedures adopted in scientific investigations.” Proper method leads to systematic proceedings and finally brings fruitful results.” For the present study, keeping in view of the objectives of the study it was opted to employ the survey method.

3.3.1 Survey method

The descriptive analysis technique has, without doubt, been the foremost well-liked and also the most generally used analysis technique within the field of education. Descriptive analysis studies square measure designed to get pertinent and precise data regarding this standing of phenomena and to draw valid general conclusions from the facts discovered. They are derestricted solely to find reality; however, they could usually end in formulation of necessary principles of data and solutions of serious issues. Descriptive studies ensure quite simply a set of data; they involve measuring, classification, analysis, comparison and interpretation. Descriptive studies investigate the phenomena in its natural settings. This technique may be applied to get the current data of current events. It helps to elucidate instructional phenomena in terms of the conditions or relationships that exist, opinions that square measure control by the scholars, researchers, folks and specialists, processes that square measure happening, effects that square measure evident or trends that square measure developing. At times, descriptive survey is that the only means through that opinion, attitude, suggestion or improvement of instructional practices and directions and alternative knowledge may be obtained.
According to Sprinthall et.al. (1991,) “Surveys are designed to gather information from samples by using tools like questionnaire etc. Surveys are used to investigate virtually anything that people do or think. The important purpose of survey research is to examine the interrelationship between the variables measured or the differences between samples in their response pattern.” Survey method is used when sample and area are fixed and the results of the study are generalized on the whole situation. It is a well tried out method of educational research. Hence keeping in the mind the objectives of the research survey method was used for investigation.

3.3.2 Population and sample

A population, in statistical terms, may be characterized as any identifiable and all around indicated gathering of people. A population may be limited or interminable. A limited populace is one in which all the individuals can be effortlessly numbered. An unbounded population is one whose size is boundless and subsequently, its individuals can't be checked. So also, a population may be genuine or nonexistent. A genuine population is one which really exists and a fanciful population is one which exists just in the creative energy. In mental and instructive research on several events the population is imaginary. By and large it is impractical to study the whole population in a solitary exploration study. There are two purposes behind this; (i) when the population is expansive it is unrealistic to contact each individual unit; (ii) when reliable results can be gotten by considering a little partition of the population, there is no utilization of squandering time and cash. One imperative utilization of inferential insights is in drawing of inductions about bigger populations on the premise of data acquired from littler gatherings chose from the population. To state as such, we wish to make explanations or speculations about the Design and Methodology population on the premise of data's acquired from the investigation of one or more examples. The degree to which we can do this with practical accuracy relies on upon the sufficiency or representativeness of the sample.

For the present study the population consists of all English medium secondary school teachers of greater Mumbai affiliated to SSC, CBSE and ICSE board. All English medium
B.Ed. colleges affiliated to Mumbai University were also considered as a part of the population. For various reasons it remains difficult to include all the members of the population for the study. In such a situation there remains a statistical facility to choose the representative sample selected from the defined population. The data obtained from a representative sample statistically yields the results, implications, trends in a logical manner. Subject availability and cost factors are legitimate considerations in determining the appropriate sample size (John W. Best, 2012). Though the defined population of the present study was finite, due to limitation of time and other resources the sample of individuals from the total population have been selected, which could represents the identified population. The individuals, representing the population were termed as the sample.

3.3.3 Sample and sampling

A Sample is a proportion of a population selected for observation and analysis. Sample consists of a number of selected individuals, objects, events which represents the total population. A sample can yield reliable results only, if it is a true representative of the whole population, unbiased and of an adequate size. Therefore it becomes essential for the researcher to take necessary precautions while selecting the sample. The process of selecting the representative sample from the defined population, which is known as sampling, is equally important in any research work.

After defining the problem of the study, together with the objectives of the study one needs to define the sample systematically for data collection. It is necessary to select a finite number of individuals from the population for a study. The systematic process of selecting a limited number of individual, institution or objects from the population for the study is called Sampling. A careful and well planned selection of the sample helps in saving time, money and efforts of the researcher without jeopardizing the reliability and validity of the findings.

Sampling is broadly classified into two probability and non-probability categories.
1. **Probability Sampling:** In probability sampling, the units of the population are not selected at the discretion of the researcher but by means of certain procedures which ensure that every unit of the population has one fixed probability of being included in the sample.

   a. **Simple random sample:** A simple random sample is one which each element of the population has an equal and independent chance of being included in the sample. A researcher may use lottery method or the table of random numbers or toss a coin to draw such type of sample.

   b. **Systematic random sample:** This method is a modified form of simple random sampling. It involves selecting subjects from the population list in a systematic rather than a random fashion. In systematic sampling, a researcher generally starts with all N units of the population listed in alphabetic or some other order. Instead of using a list of simple random numbers, data collection can be simplified by selecting say every 10th or 100th unit after the first unit has been chosen randomly. Such a procedure is called systematic random sampling. For example, from a population of 5000, a researcher wants a sample of 500 then every tenth person could be selected.

   c. **Stratified Sample:** A stratified sample is obtained by independently selecting separate simple random sample from each population stratum. When the units in the sample are selected in proportion to their presence in the population, the sample is said to be stratified random sampling. When a researcher divides the population into different strata on the basis of some characteristics and selects a sample, the technique is known as "stratified random sampling". The usual stratification factors are gender, age, socioeconomic status, educational background, residence, and occupation, religion, cast and so on.

   d. **Cluster sample:** In "cluster sampling, the unit of sampling is not the individual but rather a naturally occurring group of individuals. It is used when it is more feasible or convenient to select groups of individuals than it is to select individuals from a defined population. A cluster sample is obtained by selecting clusters from the population on the basis of simple random sampling. It involves grouping the population and then
selecting the groups or the clusters rather than individual elements for inclusion in the sample.

e. **Multi stage sample:** This is further development of an idea of cluster sampling.
   This technique is meant for big entities extending to a considerably large geographical area. The researcher may have to use two, three or four stage sampling.

2. **Non probability sampling:** In non-probability sampling, the units are selected at the discretion of the researcher. Such samples derive their control from the judgment of the researcher.

   a. **Incidental Sample** It is also called as accidental sampling. It is a term which is applied when easily available groups are taken as sample. The researcher collects information from samples that are conveniently available and willing to cooperate for providing information.

   b. **Quota sample:** In quota sampling, the population classified into several categories: on the basis of judgment or assumption falling into each category is decided. It is this second step which makes the technique one of non-probability sampling.

   c. **Purposive sample:** In purposive sampling the researcher uses his/her judgment in selecting the unit from population for study based on the population’s parameters. The researcher may exercise his own judgment based on experience for selecting sample.
3.3.4 Sampling methodology

In the present study, a two stage sampling procedure was used. At the first stage the schools for IST and Colleges for PST were selected. And at the second stage teachers were selected from the above mentioned two groups. However, this was limited to secondary level teachers for including into the sample. In the first stage of sampling, the researcher initially collected the list of the English medium secondary schools at Mumbai. For the purpose of the study the researcher selected the schools on the basis of their affiliation to respective Boards, popularly known as SSC, ICSE and CBSE. Thus, stratified random sampling was used for selecting the sample. The simple random sampling was also used for selecting the schools in each stratum, allowing equal probability to each of the school to be selected on random basis. At the second stage the teachers were selected from the schools identified on stratified random basis, as mentioned above. A lottery method was used to select schools from different Boards. This was restricted to the available teachers (sample) due to the restrictions in the permission granted for data collection by the school authorities. Therefore the available sample, in each institution was included in the sample composition of IST.

For the Selection of Pre-Service teachers in the first stage of sampling, the researcher initially collected the list of the English medium B.Ed. Colleges affiliated to Mumbai University. From the list of English medium B.Ed. Colleges of Mumbai four English medium B.Ed. colleges were selected through random sampling method. A total of 200 Pre-Service teachers were selected from four B.Ed. colleges. Researcher randomly selected four students from each class and obtained the feedback of their pre service teacher’s classroom presentation. This was done immediately after the lesson presentation of the PST. Further, to ascertain the qualitative reflections of the Principals on the Professional Competency and Professional Ethics of teachers, researcher selected sixteen secondary school Principals of different Boards for the interview purpose. (Annexure-K).
3.3.5 Sample composition

As presented above sample of the present study consists of In-Service teachers, from English medium secondary schools of different Boards. English medium B.Ed. Colleges affiliated to Mumbai University were considered for Pre-Service teachers.

The sample consists of In-Service teachers from 4 SSC, 3 ICSE and 3 CBSE English medium secondary schools of Greater Mumbai. The following Table-3.1 shows both board wise and gender wise sample distribution of In-Service and Pre-Service teachers.

Table-3.1: Board wise and gender wise sample distribution of PST & IST

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Category</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pre-Service Teachers</td>
<td>38</td>
<td>162</td>
<td>200</td>
</tr>
<tr>
<td>2A</td>
<td>In-Service Teachers from CBSE</td>
<td>30</td>
<td>36</td>
<td>66</td>
</tr>
<tr>
<td>2B</td>
<td>In-Service Teachers from ICSE</td>
<td>20</td>
<td>45</td>
<td>65</td>
</tr>
<tr>
<td>2C</td>
<td>In-Service Teachers from SSC</td>
<td>20</td>
<td>49</td>
<td>69</td>
</tr>
<tr>
<td>3</td>
<td>Total In-Service Teachers</td>
<td>70</td>
<td>130</td>
<td>200</td>
</tr>
<tr>
<td>4</td>
<td>Total Pre &amp; In-Service Teachers</td>
<td>108</td>
<td>292</td>
<td>400</td>
</tr>
</tbody>
</table>
Having defined the sample composition for further study it remains pertinent to consider the research tools to be selected, developed for the study to progress. Following presentation considers the tools used in the study.

### 3.4.0 Research tools

Well conducted research investigations postulate sufficient, reliable and valid facts. Such facts are obtained through a systematic procedure which involves various research devices or research tools. Barr resolved discussions of this sort by asking, “Which is better, a hammer or a handsaw?” Like the tools in the carpenter’s chest, each is appropriate in a given situation. Many tools are easily available and accessible that could be used in
collecting the data. Every tool has its own advantage and limitations. It is the task of the researcher to find out and select an appropriate tool according to the study. The major data gathering tools of research may be broadly classified into the following categories:

i. Psychological test
ii. Interest inventories
iii. Observation schedules
iv. Interview schedules
v. Socio metric techniques
vi. Rating scales
vii. Attitude scales
viii. Questionnaire

Researcher used following self-developed and adopted tools to collect the information from samples:

a. Teacher’s Perception of Professional Competency (TPPC)-Questionnaire developed.
b. Teacher’s Perception of Professional Ethics (TPPE)-Questionnaire developed.
c. Lesson Observation Tool (LOT)-Rating scale adopted.
d. Student’s Reflections on Teacher’s Classroom Performance (SRTCP)-Rating scale developed.
e. Interview schedule for Principals
3.4.1 Development of the tools

Research tools used in the study were systematically developed, guided by the identified objectives. Details of tool development with built in criteria used for the tool development are presented below.

3.4.2.1 Questionnaire on Teacher’s Perception of Professional Competency (TPPC)

According to Goode and Hatt (2012) “Questionnaire is a device for securing answers to questions by using a form which the respondent fills himself”. The Questionnaire consists of a series of questions or statements to which individuals are asked to respond. Questions frequently asked for facts or opinions, attitudes or preference of the respondents. Barr, Davis et.al (2012) defined “A questionnaire is a systematic compilation of questions that are submitted to sampling of population from which information is desired.” The respondents fill questionnaire themselves, thus questionnaire place heavy reliance on the validity of the verbal reports.

When no suitable instrument is available for measuring the traits or properties, the researcher is free to develop his own questionnaire. In the present study the researcher was unable to find a relevant instrument, to meet the requirements of the objectives of the study and therefore an attempt was made to develop a questionnaire to obtain the Teacher’s Perception of Professional Competency (TPPC) of Pre and In-Service Teachers. Accordingly the data was collected using the developed tool.

While developing the tool researcher followed systematic approach at every stage. Researcher went through all the available literature for identification of the broad areas and elements of Teacher’s Professional Competency. The researcher collected all the
related material from various sources including books, research survey, Encyclopedias, Dictionaries, and Internet etc. After studying the related literature the researcher selected few broad areas of elements in Teacher’s Professional Competency, which are compulsory/usually required for teacher in their teaching field and thus selected broad areas and included elements (Annexure-B).

Selected and listed broad areas and included elements of Professional Competency were given to twenty five experts from the field of education. Experts in the field of education were request to check for identified broad areas and the included element’s relevancy and appropriateness and offer their valuable suggestions (Annexure-C). Majority of the experts suggested for the inclusion of apt grammar knowledge, relevant content, problem solving, and leadership.

After duly considering the suggestions of the experts broad areas and elements of Teacher’s Professional Competencies have been finalized for the construction of the test items to be included in the questionnaire; TPPC (Annexure –C).

On the basis of selected six broad areas and their elements mentioned, (Annexure –D) the researcher has constructed 70 test items related to them in the first draft (Annexure-D). Broad area wise number of test items constructed was given in the Table No 3.2
Table-3.2: Broad area wise number of test Items for TPPC

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Broad areas</th>
<th>No. of test items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Content Knowledge</td>
<td>10</td>
</tr>
<tr>
<td>2.</td>
<td>Communication skill</td>
<td>10</td>
</tr>
<tr>
<td>3.</td>
<td>Pedagogy</td>
<td>12</td>
</tr>
<tr>
<td>4.</td>
<td>Evaluation</td>
<td>10</td>
</tr>
<tr>
<td>5.</td>
<td>Managerial skill</td>
<td>07</td>
</tr>
<tr>
<td>6.</td>
<td>Others</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Total No. of test items</td>
<td>70</td>
</tr>
</tbody>
</table>

At this stage the rating scale consisting of 70 items were given to 25 experts of the field (Annexure-A). Experts from the field of education were requested to reflect on the relevancy and appropriateness of the test items which were based on the broad areas identified including their elements. Accordingly they were requested to give their suggestions for the improvement of the tool TPPC. The suggestions which were given by 80% of experts were incorporated in the second draft of the tool TPPC. The common suggestions were as follows.

1. Improve the language of the test items
2. Ask items in small sentences but with clear understanding
3. Make appropriate changes in item formation
4. Ask pinpointed items and avoid ambiguous language

After taking into account of the response from experts, together with their comments and recommendations a revised tool TPPC was prepared consisting of fifty test items. Board areas and their element wise selected number of items were presented in the Table 3.3. (Annexure-F). This includes both positive items as well as negative items. Positive items are direct and in favour of the element and negative items are opposite to the element selected. This is done and arranged in random sequence to prevent the directional bias of the respondent.
Table No-3.3: Broad area wise number of items for TPPC after expert suggestions

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Broads area</th>
<th>Positive Items (Total)</th>
<th>Negative Items</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Content Knowledge</td>
<td>9, 31, 35, 38, 41(5)</td>
<td>39, 43 (2)</td>
<td>7</td>
</tr>
<tr>
<td>2.</td>
<td>Communication skill</td>
<td>5, 30, 34 (3)</td>
<td>3, 32, 37, 42 (4)</td>
<td>7</td>
</tr>
<tr>
<td>3.</td>
<td>Pedagogy</td>
<td>11, 15, 17, 22, 46 (5)</td>
<td>1, 29, 49, 50 (4)</td>
<td>9</td>
</tr>
<tr>
<td>4.</td>
<td>Evaluation</td>
<td>23(1)</td>
<td>7, 8, 13, 19 ,48 (5)</td>
<td>6</td>
</tr>
<tr>
<td>5.</td>
<td>Managerial skill</td>
<td>24(1)</td>
<td>10, 20, 26, 28 (4)</td>
<td>5</td>
</tr>
<tr>
<td>6.</td>
<td>Others</td>
<td>4, 12,18, 33, 36, 44 (6)</td>
<td>2, 6, 14, 16, 21, 25, 27, 40, 45, 47 (10)</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>21</strong></td>
<td><strong>29</strong></td>
<td><strong>50</strong></td>
</tr>
</tbody>
</table>

3.4.2.2 Scoring procedure

It is important to have a clearly defined scoring procedure to be used over the responses obtained on the tool. This helps in unambiguous and accurate statistical treatment of the data for further analysis. Responses were recorded on the TPPC Tool sheet itself against each test item. Likert scale, with five alternatives, was given with separate and individual cell indicating the intensity of the responses. Five alternatives for each of the test item given to the respondents are as follows.

1. Strongly Agree
2. Agree
3. Undecided
4. Disagree
5. Strongly Disagree
Table-3.4: Scoring scheme of TPPC

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Responses</th>
<th>Scores for Positive Item</th>
<th>Scores for Negative Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Strongly Agree</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Agree</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Undecided</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>Disagree</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td>Strongly Disagree</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

This intermediate tool was administered on twenty five Pre-Service teachers and twenty five In-Service teachers of secondary schools from different boards as a pilot test. This was done to have a trial run and evaluation of the whole process and identify any practical difficulty in test administration as well as the scoring process of TPPC Tool. It remained smooth and trouble free exercise and the tool TPPC was, thus, made ready for use on the whole of the sample.

3.4.2.3 Reliability

Reliability of the tool is one of the most important elements of a sound and a standard test. According to John Best (2012), “Reliability is the degree of consistency that the instrument or procedure demonstrates: Whatever it is measuring, it does so consistently.” The tools that have high coefficient of reliability, errors of measurement have been reduced to minimum. Reliability, in brief, is defined as the consistency of results from a test. Literature provides four important methods of evaluating the reliability of an instrument. They are:
1. Split-Half Reliability

2. Test-Retest Reliability

3. Parallel Forms Reliability

4. Inter-Rater Reliability

For the present study split-half reliability was used because the questionnaire measures the extent to which all parts of the test contribute equally. This is done by comparing the results of one half of a test with the results from the other half. A test can be split in half in several ways, from the collected data, the scores of high and lower scores were separated according to even and odd numbers of items. It determines how much error in a test score is due to poor test construction. To calculate this test was administered once and then the reliability index was calculated by coefficient alpha. That is Cronbach’s alpha.

Low reliability coefficient indicates probable measuring of more constructs than it is designed to measure. Then one needs to revise the measure to focus more directly on the construct of interest. In case of dichotomous items (e.g., right-wrong answers) the KR-20 formula is the best accepted statistic. But, for Likert scale or other types of items use of the Spearman Brown formula is recommended in the literature. However, if each test item has a right answer then literature recommends the use of KR-20 and not with Likert scale. In the present study a Likert Scale was administered for both the TPPC and TPPE, as they do not have just one correct answer, but five alternatives for each of the test item in the tool. Accordingly, the preferred statistic is to calculate the split-half reliability coefficient alpha (called Cronbach’s alpha).

One of the problems with the split-half method is that the reliability estimate obtained using any random split of the items is likely to differ from that obtained using another set of halves. And therefore, one of the solutions to this problem is to compute the Spearman-Brown corrected split-half reliability coefficient for every one of the possible split-halves and then find the mean of those coefficients. This is the motivation for Cronbach’s alpha.
Besides, Cronbach’s alpha is superior to Kuder and Richardson Formula 20 since it can be used with continuous and non-dichotomous data. In particular, it can be used for testing with partial credit and for questionnaires using a Likert scale, as done here in the present study for developing the Tools TPPC and TPPE. Items on an instrument TPPC and TPPE were not scored right versus wrong, but like an attitude instruments that use the Likert scale, with five alternate reflections to choose with. Further, Cronbach's alpha is usually used for scores which fall along a continuum; it will produce the same results as KR-20 with dichotomous data (0 or 1). Cronbach's alpha can be easily computed using excel spreadsheet. The reliability coefficient for the Tool of Perception of Professional Competency was computed and Cronbach's alpha was found to be 0.77 hence we can say that the questionnaire has Good reliability and during data collection the error of measurement have reduced to a minimum.

3.4.2.4 Validity

It is essential to ensure the validity of the tool besides its reliability. Tool needs to be valid for the given requirements of data collection. In this investigation, the problem of validity of the test was approached from two sub points.

a. Content validity
b. Construct validity

a) Content Validity

According to Best and Khan (1996) “Content validity refers to the degree to which the test actually measures or is specifically related to the treat for which it was designed.” In order to safe guard this type of validity; a number of steps were taken by the researcher. These include selection of broad areas and their elements for TPPC, and TPPE, suggestions from experts, selection of words used in items, item analysis, and preparation of final draft with the calculation of reliability. Content of the test items needs to be valid
as guided by the objectives of the study. Therefore criteria based test items, as approved by the experts in the field ensured the content validity of the tool.

b) **Construct Validity**

This validity is concerned with the meaning and interpretation of the test scores obtained in terms of psychological or theoretical constructs. A construct is a trait of a perception of Professional Competency / Professional Ethics temperament which is hypothesized to explain certain aspects of behavior. In this investigation Perception of Professional Competency and Perception of Professional Ethics remained as two important constructs. This aspect guided the researcher to enlist the broad areas and frame the test items for TPPC and TPPE.

After considering the reliability and validity of questionnaires on TPPC and TPPE Tools they were finalized for the collection of data. (Annexure -F)

### 3.4.3.1 **Questionnaire of Teacher’s Perception of Professional Ethics (TPPE)**

Researcher followed systematic procedure at different stages of tool preparation in developing TPPE. All the available literature for identification of the broad areas and their elements of TPPE were considered in the beginning. Related material from various sources including books, research survey, Encyclopedias, Dictionaries, and Internet etc. were consulted. This led the researcher to select few broad areas and their elements of TPPE. Selected Broad area and their elements were placed at (Annexure-B).

These broad areas together with the elements were given to twenty five experts of education field with a request to reflect on them and give their suggestions (Annexure-A), for further improvement of the tool. Following broad areas and their elements have been finalized for the construction of the questionnaire TPPE (Annexure-B). On the basis of selected broad areas and their elements mentioned here, the researcher has constructed the tool with 80 test items in the first draft (Annexure -E). The number of items constructed is given in the Table No 3.5.
Table-3.5: Broad areas wise number of test items in TPPE

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Broad areas</th>
<th>Number of test items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Character</td>
<td>16</td>
</tr>
<tr>
<td>2.</td>
<td>Behaviour</td>
<td>19</td>
</tr>
<tr>
<td>3.</td>
<td>Attitudes</td>
<td>21</td>
</tr>
<tr>
<td>4.</td>
<td>Beliefs</td>
<td>13</td>
</tr>
<tr>
<td>5.</td>
<td>General</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Total test items</td>
<td>80</td>
</tr>
</tbody>
</table>

This first draft tool with 80 test items was given to twenty-five experts in the field of education (Annexure-E). They were requested to give their suggestions for the improvement of the tool. The suggestions which were given by 80% experts were incorporated in the second draft of the tool. The common suggestions were as follows.

1. Improve the language of the items
2. Ask items in small sentences but with clear understanding
3. Make appropriate changes in item formation
4. Ask pinpointed items and avoid ambiguous language

After taking into account the response of experts together with their comments and recommendations a revised tool, TPPE was prepared with fifty test items. Test items were identified under different broad areas and their elements. They were also considered as positive and negative statements, as mentioned below. Direct statements in agreement with the objectives were considered as positive statement and statements placed in reverse order that are opposite to the stated objectives were considered as a negative statement. Table 3.6. (Annexure-F) gives the details.
Table-3.6: Broads area wise number of items for TPPE after experts’ suggestions

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Broad areas</th>
<th>Positive statement</th>
<th>Negative statement</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Character</td>
<td>9, 10, 12, 19, 37, 43 (6)</td>
<td>1, 4, 8, 25 (4)</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Behavior</td>
<td>7, 11, 20, 30, 39, 40, 45 (7)</td>
<td>2, 26, 29, 38, 47, 50 (6)</td>
<td>13</td>
</tr>
<tr>
<td>3</td>
<td>Attitude</td>
<td>5, 13, 32, 44, 49 (5)</td>
<td>18, 22, 24, 28, 33, 35, 36, 42, 48 (10).</td>
<td>14</td>
</tr>
<tr>
<td>4</td>
<td>Beliefs</td>
<td>3, 15, 16, 17, 23 ,31 (6)</td>
<td>34 (1)</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>General</td>
<td>41, 46 (2)</td>
<td>6, 14, 21, 27 (4)</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td><strong>Total test items</strong></td>
<td><strong>26</strong></td>
<td><strong>24</strong></td>
<td><strong>50</strong></td>
</tr>
</tbody>
</table>

3.4.3.2 Scoring procedure

The subject’s responses were recorded on the tool TPPE itself for each test item of the tool made on a Likert scale. Five alternatives were given in individual cell indicating the intensity of the response of the subject. Five alternatives for each of the test item were as follows.

1. Strongly Agree
2. Agree
3. Undecided
4. Disagree
5. Strongly Disagree
Scores assigned to above alternatives for negative statements and positive statements are shown in Table No. 3.7

Table-3.7: Scoring scheme of TPPE

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Responses</th>
<th>Scores for positive items</th>
<th>Scores for negative items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Strongly Agree</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Agree</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Undecided</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>Disagree</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td>Strongly Disagree</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

Pilot test was administered on select sample of twenty five Pre-Service teachers and twenty five In-Service teachers of secondary schools from different boards. The administration of pilot test facilitated the researcher to understand the smooth test administration and overcome any difficult in regard to test time, language related difficulties, if any, etc. Further psychometric parameters like reliability and validity were also considered for the development of TPPE, on the same lines as that to the development of the tool TPPC, as mentioned in the preceding sections. Accordingly the Cronbach's alpha was computed for TPPE and found to be 0.801, which is considered as an excellent result. Psychometric parameters like, reliability and validity were considered for developing TPPE following the identical procedure adopted in developing TPPE and presented above in sections (3.4.3.1 and 3.4.3.2).

Besides developing the above mentioned two tools namely, TPPC and TPPE researcher also employed Lesson Observation Tool (LOT) for observing the teachers in the actual classroom setting, while they were presenting the lesson in the classroom. Details of this tool are given below.
3.4.4 Lesson Observation Rating scale (LOT)

According to Young P.V (1956)” Observation is a systematic and deliberate study through the eye of spontaneous occurrences at the time they occur. The purpose of observation is to perceive the nature and extent of significant interrelated elements within complex social phenomena, cultural patterns or human conduct”.

The observer must know just what to look for he or she must be able to distinguish between the significant and insignificants aspects of the situation. However, objectivity is essential and careful and accurate methods of measuring and recording has to be employed in observing a process or event while it is occurring in front of the observer. These aspects are more important when a teacher’s performance is to be observed in the classroom.

The researcher adopted a Lesson Observation Rating Scale prepared by A. Ramachary (2011); According to the need of the present study the researcher modified original rating scale of class room observation under the guidance of its author. The selected fifteen elements of the tool are shown below (Table No 3.8) and Lesson observation rating scale is placed at the end (Annexure- G)
### Table- 3.8: Elements for Lesson Observation

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
</tr>
<tr>
<td>2</td>
<td>Link-up</td>
</tr>
<tr>
<td>3</td>
<td>Questioning</td>
</tr>
<tr>
<td>4.</td>
<td>Explanation – Language</td>
</tr>
<tr>
<td>5</td>
<td>Explanation – Dynamics</td>
</tr>
<tr>
<td>6</td>
<td>Explanation – HOTS</td>
</tr>
<tr>
<td>7</td>
<td>Teaching Aids</td>
</tr>
<tr>
<td>8</td>
<td>Board work and Power-point presentation</td>
</tr>
<tr>
<td>9</td>
<td>Recapitulation</td>
</tr>
<tr>
<td>10</td>
<td>Evaluation</td>
</tr>
<tr>
<td>11</td>
<td>Class Management</td>
</tr>
<tr>
<td>12</td>
<td>Content</td>
</tr>
<tr>
<td>13</td>
<td>Activities</td>
</tr>
<tr>
<td>14</td>
<td>Assignment and Closure</td>
</tr>
<tr>
<td>15</td>
<td>Non-Cognitive Elements</td>
</tr>
</tbody>
</table>

For the purpose of the present investigation the data obtained on the tool LOT was analyzed quantitatively as well as qualitatively. Scoring procedure for qualitative purpose is given below.
3.4.4.1 LOT scoring procedure

Total fifteen elements in the tool LOT were related to various aspects of classroom teaching. Every element carries maximum 10 score points. During observation the observer rates the performance of the teacher and records the scores. Rating of the performing teacher was done on a 10-point scale and scores were recorded based on their performance in the classroom. In the end, all the scores of different elements were added to find out the teacher’s performance in the class. As a result, a teacher can score a maximum of 150 and a minimum of 15.

For qualitative analysis, the researcher further divided scores of each element into three categories as detailed below (Table-3.9) and based on this, a teacher’s qualitative categorization was made for the present study.

Table-3.9: Teacher’s qualitative category and score range

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Teacher’s qualitative category</th>
<th>Score range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very Good</td>
<td>8-10</td>
</tr>
<tr>
<td>2</td>
<td>Good</td>
<td>5-7</td>
</tr>
<tr>
<td>3</td>
<td>Satisfactory</td>
<td>1-4</td>
</tr>
</tbody>
</table>

In addition to the Lesson Observation of the teachers, SRTCP tool was used to obtain the reflections of the students on their teacher’s classroom performance. Details of SRTCP tool are given below.

3.4.5.1 Student’s Reflections of Teacher’s Classroom Performance

Main purpose of SRTCP was to know the student viewpoint towards his/her teacher and teaching just after he/she conducted his/her class. They also know what to expect from their teachers as far as teaching is concerned. Students’ involvement in teacher
performance is considered to be important. To study about their viewpoints researcher developed a small rating scale for the students. (Annexure-H).

3.4.5.2 SRTCP scoring procedure

There were ten statements in SRTCP scale and each statement contains five alternatives which are given below. Students were informed to tick mark on any one of the five alternatives given for each of the statements after observing the teacher’s classroom performance. Scores for each response were tabulated and shown below.

1. Strongly Agree
2. Agree
3. Undecided
4. Disagree
5. Strongly Disagree

Table No-3.10: Score points on SRTCP

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Responses</th>
<th>Scores for positive items</th>
<th>Scores for negative items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Strongly Agree</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Agree</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Undecided</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>Disagree</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td>Strongly Disagree</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>
A teacher can get a maximum score of 50 and a minimum score of 10. After observing the class, researcher randomly selected four students from the class and asked them to fill the SRTCP. After calculating scores of each student, researcher added all the scores of four students. The final scores which comes after calculating the average of four students was considered for analysis.

The fifth and final tool used in the present study is concerned with the responses sought from the Principals of different institutions. This was a structured interview of the Principal and details are given below.

3.4.6.1 Structured Interview of Principal (SIP)

“The purpose of interviewing is to find out what is in or on someone else’s mind the purpose of open-ended interviewing is not to put things in someone’ mind but to access the perspective of person being interviewed” (Patton, 2012).

Ethics an open ended interview of the Principal was included in the study. According to Kerlinger (2001) “The interview is a face–to–face interpersonal role situation in which one person, the interviewer, asks a person being interviewed, the respondent, the questions designed to obtain answers pertinent to the purposes of the research problem.” Accordingly, to obtain the Principal’s response on the teachers in respect of Professional Competency and Professional Ethics an open ended interview of the Principal was included in the study.

A Principal is a responsible and an experienced person who overviews and guide the teachers to maintain a good level of Professional Competency and the Professional Ethics. Keeping this in view the researcher has preferred to meet the Principals, for better understanding of their perception in respect of Professional Competency and Professional
Ethics. Accordingly, an open ended and structured interview of Principals was prepared by the researcher. The following key elements were considered when interview questions were prepared. (Annexure-I)

1. The meaning of PC and PE.
2. Teachers’ Perception of PC and PE
3. Ways of Observing PC.
4. Factors influencing the PC and PE.
5. Status of present day teacher’s PC and PE.
6. Principal’s suggestions for enhancing the PC and of PE of teachers.
7. Evaluation of PC and PE.
8. Controlling of unethical practices
9. Relationship between PC and PE.

Collective views of all the principals related to their perception on Professional Competency and Professional Ethics were discussed in qualitative analyses of the investigation and presented in chapter no. 4.

3.5.0 Data collection

Data collection is an important step in the research process. Precise and systematic data collection is essential for proper investigation. Seeking advance permission to conduct data collection in any institution is the first step. Thereafter fixing the schedules, orienting the subjects for providing truthful data etc. are some of the key and significant activities. In present investigation data were collected in following manner by the researcher.
personally, ensuring truthful data collection in a logical manner. Data collection schedule followed by the researcher is placed at the end (Annexure-N).

A). From Secondary Schools

1. Seeking essential permissions from management and school Principals
2. Administration of TPPC and TPPE on In-Service teachers
3. Class room observations of the teachers who had filled TPPC and TPPE
4. After each class room observation administration of SRTCP on four students of respective classes
5. Interview of School Principals

B). From B.Ed. Colleges

1. Seeking essential permissions from College managements and Principals
2. Administration of TPPC and TPPE on Pre-Service teachers
3. Class room observations of the Pre-Service teachers during their practice teaching sessions who had filled TPPC and TPPE
4. After each class room observation administration of SRTCP on four students of respective classes

3.6.0 Data analysis

Researcher requires the data from the subjects for required analysis, which in turn paves the way for drawing summative inferences. In carrying out this one needs to look into the data critically for suitable organization and proper presentation, which necessitates the investigator to classify, distinguish and make appropriate processing of data. All such elements put together represent as statistical consideration.
(i) **Mean**

One of the statistical considerations, which often many researchers deploy, is the average value also known as “Mean”. Mean value obtained from the data over a large group enables us to compare the general trend of the group. It also helps us to compare two groups mean values. Mean never means that all the values in the group resemble the mean value. Values in the group may stretch across some range. Yet mean is useful parameter to the researcher to talk about the central tendency of the group under consideration.

(ii) **Standard Deviation**

In addition to the central tendency like the Mean or median or mode there are other parameters like various or deviation or standard deviation. When a researcher considers the group characteristics he or she also looks into the spread in the group in respect of any particular value, like mean score. Essentially, standard deviation speaks of spread in the score, unlike the central tendency shown in the mean. When the researcher gets low value of standard deviation it represents that the values of the given group are close to the mean value. Similarly, when the standard deviation remains high that indicates the individual values in the group are spread out widely with respect to the mean value of the group.

(iii) **Mean Percent Score**

Mean Percentage Scores (MPS) were calculated by following formula-

\[
\text{MPS} = \left( \frac{\text{Mean Scores}}{\text{Maximum Possible Score}} \right) \times 100
\]
(iv) **t - Test**

When the investigator is required to find the difference between the two group’s performances then he or she may go for finding their respective group’s Mean values. Along with this the researcher also finds their Standard Deviation values. In case the means of two groups differ by some value then the needs arises to find whether the differences in the Mean values of two groups are significant or not? In order to find the significance of the difference in the Means of the two groups can be found using as statistical procedure known as administering the t-test. In other words, t-test enables the probability of recurrence of the same mean difference between the two groups. In case two samples are related, paired t – test or difference test is for judging the significance of the mean of difference between the two related samples (Kothari, 2008,). This is based on the consideration of t-distribution. Also one may choose the comparison of three or more Means. In such cases the investigator employs ANOVA, or ANACOVA Analysis of variance or co-variance. However, the standard values tabulated and made available to the researcher, under some confidence level, say, at 95% level or at 99% level. In such cases the computed values are compared with the standard values and the significance of the result is interpreted, accordingly. This statistical procedure helps the researcher in knowing the difference in the Means of two groups, if any, together with its significance.

(v) **Analysis of variance (ANOVA)**

ANOVA is a non-parametric test that is used to study more than two samples or datasets. It helps in explaining the amount of variation in two datasets. In a datasets, two main types of variations can occur. One type of variation occurs due to chance and other type of variation occurs due to specific reasons. These variations are studied separately in ANOVA to identify the actual cause of variation and help the researcher to take effective decisions. This statistic was used to compare the means of three different boards on different sets of data.
(vi) **Coefficient of correlation**

When the researcher’s study involves the question like, are the two parameters related to each other? Say, Does the performance in Math’s in any way related to the performance in the science? In such cases the researcher needs to find the relation between the two sets of scores. In statistical procedures investigator needs to check whether there is any correlation between the two select parameters. Procedures in the statistical consideration offer different kinds of correlations, such as Rank correlation and the Pearson’s Product moment correlation etc. Depending on their requirement and the type of data the researcher chooses the required statistical procedure. Correlation between the two parameters or more can take the values of positive or negative. Positive correlation implies that the two variables or directly related, in other words if one variable rises implies the other variable also increases. Similarly, negative correlation implies if one quantity increases the other variable decreases. However, these correlation values can be maximum 1 and minimum -1. When the relationship between two sets of variables is a pure chance Relationship, there is no correlation (Best & Kahn, 2005). Single value of correlation indicates the degree of relation between the two variables under the consideration. A zero correlation means that there is little or no relationship between the two variables to determine the degree of relationship between these variables (Chandrakandan & Karthikeyan, 2004). In the present study Pearson’s Product Moment of correlation was used for analyzing the data for needful interpretation.

All the above mentioned statistics were used to analyze the data obtained from the subjects on different variables.

### 3.7.0 Summary

This chapter highlighted the research methodology, containing sample selection, tool development, data collection and statistical techniques used for the analysis of data.

The steps of constructing research tools i.e. Questionnaire of Perception of Professional Competency and Questionnaire of Perception of Professional Ethics, Lesson Observation
Tool, Student’s Reflections of Teacher’s Classroom Performance, Principal interview were discussed in detail. The process of identifying the criteria and thereafter developing the tool with relevant test items and the procedures employed for establishing reliability coefficient and validity have been explained in detail in the preceding sections of this chapter.

At this stage it is essential to statistically treat the data obtained from the subjects and analyze it for further inferences and to find implications etc. Detailed analysis of data obtained on the entire sample and its segments were presented for further discussion and interpretation in the following sections of the next chapter.