RESEARCH DESIGN

A research is considered to be a formal systematic and intensive process of carrying out a study with a proper method of analysis. It includes all the planned techniques and strategies followed in carrying out the study. The design of the study is of prime importance in attracting any research problem in scientific manner. It deals with matters such as selecting sample for research developing tools and preparing for data collection.

The research design is the detailed plan of the investigation. In fact, it is the blueprint of the detailed procedures of testing the hypotheses and analyzing the obtained data. Thus, the research design helps the researcher in testing the hypotheses by reaching valid and objective conclusions regarding the relationship between independent and dependent variables.

Kerlinger,N.F (2009) has defined research design as the plan, structure and strategy of investigation conceived so as to obtain answers to research questions control variance. The plan includes an outline of what the investigator will do from formulating the hypothesis through the analysis of results to the conclusion. In other words a research is a systematic method of operating certain variables under controlled conditions.

This chapter provides a description of the research design under the following headings:

- Method of the study
- Population and Sample
- Variables in the Study
- Tools used
- Data collection
- Procedure of cost benefit analysis
- Methods of Evaluation
- Statistics used
3.1 **METHOD OF THE STUDY**

The descriptive method has been used in the present study.

3.2 **POPULATION AND SAMPLE**

All the students registered in the session 2005-06 and 2006-07 and the session 2013-2014 for one year bachelor degree programme i.e. Bachelor of Education (B.Ed) of the four institutions of Allahabad– K.P. Training College, S.S. Khanna Degree College, Ewing Christian College and Allahabad Agriculture Deemed University, - constituted the population for the study.

The sample was consisted of 550 students from different nature of teacher training institutions of Allahabad:

**Table-3.1:** Description of the sample

<table>
<thead>
<tr>
<th>Type of Institutions</th>
<th>Name of the Institution</th>
<th>No. of students from the session (2013-14)</th>
<th>No. of pass out Students from the session 2005-06 &amp; 2006-07</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Government funded</td>
<td>K.P. Training College, Allahabad</td>
<td>100</td>
<td>37</td>
</tr>
<tr>
<td>2. Self-financed</td>
<td>S. S. Khanna Degree College, Allahabad</td>
<td>100</td>
<td>56</td>
</tr>
<tr>
<td>3. Autonomous</td>
<td>Ewing Christian College, Allahabad</td>
<td>100</td>
<td>25</td>
</tr>
<tr>
<td>4. Deemed</td>
<td>SHIATS</td>
<td>100</td>
<td>32</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>400</strong></td>
<td><strong>150</strong></td>
</tr>
</tbody>
</table>

The four institutions were selected and from each institution 100 students were selected randomly from the session 2013-14. Total 400 students were selected randomly of the session (2013-14) from the above mentioned four institutions especially to find out whether teacher education students differ on qualitative benefits
(perception about individual benefits, family benefits and societal benefits, attitude towards teaching and teaching self – efficacy).

The researcher tried her best to contact the pass out respondents and send about 480 schedules to collect the private costs and benefits of pre service teacher education programme at secondary stage but received only 150 schedules. Therefore, using purposive sampling technique, 150 students (who passed the final year examination in their first attempt) of these institution who were enrolled in the academic session of 2005-06 and 2006-07 has been taken as sample for calculating the costs and benefits of pre service teacher education programme at secondary stage. The session 2005-06-07 has been chosen because after completing the training the student teachers generally wait sometime for their first job so 5-6 years was taken as probation period.

3.3 VARIABLES IN THE STUDY

This was basically cost-benefit study and quantitative in nature. The dependent variable were benefits which were quantitative (monetary benefit) and qualitative (perception of individual, family and societal towards teacher education programme, attitude towards teaching, teaching self-efficacy and job satisfaction) in both the nature. The private cost was independent variable in this study.

3.4 TOOLS USED

Present study had been conducted to explore the cost benefit analysis of pre service teacher education programme at secondary stage. Taking the specific and contextual attributes of the study into consideration suitable tool was developed by the researcher. The two types of costs were collected by the researcher. To measure the institutional cost the researcher developed “Information Schedule for the Institutional Costs” (Appendix-A) in consultation with the experts and to collect the private costs and benefits by the pass out students the researcher developed “Information Schedule for Private Costs and Benefits” (Appendix- B) in consultation with the experts.
3.4.1 Procedure followed in the development of Tool

To prepare schedule was the first step before going in the field to collect the data. The following procedure used in the development of tool:

- The researcher identified various indicators for tool;
- The tool was circulated among experts for their comments and suggestions. The researcher personally discussed with experts and got immediate feedback to modify the tool; on the basis of the feedback obtained from the experts, it was relevant to make the following changes:
  - Language and composition of the statements was relooked;
  - Researcher decided made modifications in title of the tool;
  - Some personal information was added in information schedule for private costs and benefits;
  - Response options became three choice (Agree/Uncertain/Disagree) while it were five (Totally Agree/Agree/Uncertain/Disagree/Totally Disagree) in initial stage of schedule.

To calculate the other qualitative benefits of pre service teacher education programme (teaching self-efficacy, attitude towards teaching and job satisfaction) standardized tests were used. The other tests were also reviewed by the researcher but due to the appropriateness used these tools. As these tests were standardized on student teachers of Allahabad city and respondents of the study for measuring the teaching self-efficacy and attitude towards teaching were student teachers of Allahabad city.

Job Satisfaction Scale by Meera Dixit was used beside other available tools because this tool was standardized for the primary and secondary level teacher both. Pass out respondents for this tool was posted not only secondary level but also at primary level. Therefore, the researcher found these tools most appropriate for the present study. The following standardized tools were used to fulfil the objectives of the study:
3.4.2 Description of the tool

There were two types of self-constructed tools used in the study. 1) Information schedule for the Institutional Costs was used to collect institutional costs of pre service teacher education programme from the institutions and 2) Information Schedule for Private Costs and Benefits include the information regarding the private costs and benefits of pass out students.

Information schedule for the Institutional Costs consisted of information regarding the total expenditure of institutions. This schedule was divided into six subsections which consisted of:

- **Section-‘A’- General information of the institution:** In this section the researcher had collected the general information of institutions which was necessary to know the background of the institution.

- **Section-‘B’- Enrolment of the students in the studied academic sessions:** Information related to total enrolment year wise and on the basis of gender was received by the institution to find out the unit cost year wise and on gender basis.

- **Section-‘C’-Information about Teachers and Staffs:** Total number of teaching and non-teaching staff year wise and gender basis in each type of institution were collected by the researcher. To know their working status this subsection was again subdivided into two parts: i) Regular and ii) Temporary. The grade wise information about teaching staff was also collected into this section.

- **Section-‘D’-Performance of the students in the studied academic sessions:** Only marks sheet do not represent the performance of the students. To calculate the benefits of pre service teacher education programme, it was needed to know about their employment status also. Therefore, the researcher collected the information regarding the current status of pass out students after doing pre service teacher education programme.

- **Section-‘E’-Sources of the income of the institution:** Each type of institution had different sources of income beside tuition fees. The fund
could be received by the central or state government or by any other sources like donations, trust, society contribution etc. It was important to collect these sources of income to calculate the institutional costs.

➢ **Section-‘F’-Expenditures in the institution**: There were two types of expenditures done by each type of institution- i) recurring expenditure and ii) non recurring expenditure which is further divided while calculation times into – Labor Cost and Non-Labor Cost. Labor cost means payment to the teaching and non-teaching staff while non labor cost include cost of teaching material, office expenditure, cost of library services etc.

Beside this the overall surplus/deficit in the institution was also calculated for both the years. Lastly, views regarding the quality of pre service teacher education programme were also collected through schedule.

✔ **Information Schedule for Private Costs and Benefits** was used to collect the data of the Private Costs and Benefits of Pre Service Teacher Education Programme from pass out students. Firstly, the personal information of pass out students of the above motioned all the four institutions were collected through schedule. It was necessary to know the background of the respondents to analyze the results precisely. Further, the schedule was divided into four sections which consisted of:

➢ **Section- ‘A’ – General Information of the informants**: The information regarding the academic and educational background, experience, and purpose of join this course was collected in this section. This information was important to collect as these were the factors which directly affect the benefits of pre service teacher education programme.

➢ **Section-‘B’- Expenditure on Education done by the informants**: Beside tuition fees there were other expenditures which were borne by the informants like, books and notebooks, stationery, transportation, personal expenses etc. However, some informants while pursuing pre service teacher education programme reside in hostel or rental rooms, their expenditures were little bit more on some other items like, food, rent etc.
Some of the informants got scholarship so their private costs were less than their counterparts although their number was very less in the sample.

- **Section-‘C’- Employment Status and Earnings of the informants:** To calculate the private direct benefits in quantitative terms employment status and earnings were necessary to collect. The information regarding the designation, sector, gross salary (annually) was also collected by the researcher.

- **Section-‘D’- Perceptions of the informants regarding individual, family and social benefits:** Teaching is considered as service not an occupation. Beside quantitative benefits there are some other qualitative benefits which are gained after doing pre service teacher education programme at secondary stage. Therefore, the researcher developed a three point scale (Agree, Uncertain and Disagree) to know their response on perception regarding individual, family and social benefits. This was collected on the basis of following points:

  - **Benefits to the Individual:**
    - Confidence of teaching,
    - Communication Skill,
    - Language proficiency,
    - Become more conscious about his/her sanitation after joining this course,
    - Improve the quality of life- socio-economic status, life satisfaction and happiness etc.

  - **Benefits to Family- Parents / Guardians:**
    - Inspired more children to join this training,
    - Reasons of allowing another family member to join this course,
    - Benefits other family members get after joining this course by you,
    - Relationship with other family members,
    - Effect on younger siblings,
    - Perception of your parents about you after joining this course etc.
Benefits to Society:

- More Skilled Teachers,
- Improvement in quality of teaching-learning process,
- Counseling for weaker students,
- Extra academic help to students,
- Social Cohesion in communities or social capital etc.

For collecting the other qualitative benefits standard tools were used which were efficiently fulfilling the objectives of the study.

Costs of education measured in the present study is graphically represented in the figure 3.1

**Figure – 3.1**

Beside the above self-constructed schedule to measure the quantitative benefits, to measure the qualitative benefits some standardized tools was also used. These are:
3.4.2 Teaching Self Efficacy Inventory by Misra and Dubey (2012)

For measuring this ability a standardized test by Misra and Dubey (2012) was used which was standardized on student teachers of Allahabad city. Test-retest reliability of this test was 0.66. Predictive validity of the TSEI was established against teacher’s rating of students-teachers in reference to their teaching competency. It was found to be .305. Predictive validity of TSEI was also ascertained by correlating TSEI score with internal assessment marks of the student-teachers (r=.198, p, 05, N=99). Percentile norms were also calculated for B.Ed students.

3.4.3 Attitude towards Teaching by Misra and Upadhya (2012)

A standardized test made by Misra and Upadhyay (2012) was used to measure attitude towards teaching. It was standardized on student teachers of Allahabad city. Test-retest reliability of this test was 0.687. Concurrent validity of the TAS was established by correlating the scores of TAS with the scores obtained on TAI of S.P. Ahluwalia. The value of r was .564 (N=100). Percentile norms were also calculated for B.Ed students.

3.4.4 Job Satisfaction Scale for Teachers by Dixit (1993)

This scale consist 52 items and can be used for the primary and secondary level teachers. There were many tools developed to measure the job satisfaction of the teachers but because after doing B.Ed many pass out students join primary section also so this tool was most suitable tool for this study.

3.5 DATA COLLECTION

The study makes use of both primary as well as secondary data. The primary data were collected by schedule and office records available in the institutions. The students were traced via retrospective survey to calculate the payoff to the training that they received.

3.6 PROCEDURE OF COST BENEFIT ANALYSIS

Cost-benefit analysis (CBA) is a technique that allows program evaluators to determine whether benefits exceed costs for a given program (Himburg & Keane).
With CBA, both program costs and benefits are assigned monetary values. The results are expressed as discounted net benefits (program benefits minus program costs), as a ratio of benefits to costs, or as a rate of return. The difference between benefits and costs indicates whether a specific program results in a net gain or net loss. This information can assist decision makers in selecting among various programs or different strategies within a program (Haddix, Teutsch, Shaffer & Dunet).

**Figure-2:** Process of Cost Benefit Analysis

- Determine scope and objectives
- Identify constraints
- Identify alternatives
- Identify costs and benefits
- Quantify costs and benefits
- Calculate net present value

*Source:* Adapted from Department of Finance (1991, p. 6).

### 3.6.1 Measurement of training costs

There are two types of costs that have been calculated by the following formulas:

\[
\text{Institutional costs} = \text{Recurring costs} + \text{non-recurring costs}
\]

The present study is limited to only Recurring costs, as most of the teacher education institutions do not have separate campus. They are operating in the premises of the existing colleges and as teacher education programme is only one year programme so need not much to do non-recurring cost frequently as per year even in mostly institution equipment and sometimes land are also donated by the society or
community. However, the equipments and furniture that were purchased in the year (2005-06-07) have been taken into consideration to calculate the institutional cost.

Therefore, Recurring cost is considered here as total institutional cost because non-recurring cost is not calculated in the present study for the above mentioned reasons. So, total institutional cost can be further divided into two parts:

**Total Institutional cost = Total Labor Cost + Total Non- Labor Cost**

Labor Cost is the payment paid to teaching staff and clerks and peons while Non- Labor cost is the cost of teaching material, office expenditure, cost of library services and other expenditure.

Unit Institutional cost has also been calculated for the different institutions using the following formula

**Unit Institutional Cost= Total institutional cost / enrolment during i\(^{th}\) year**

The institutional cost was analysed for four type of institutions - 1) Govt. funded, 2) self financed, 3) autonomous and 4) deemed

**Private costs = Household expenditure on education + opportunity costs**

However, in the present study, tuition fees, other school fees, uniforms, transportation, books and other supplies are considered but opportunity cost will not be considered due to lack of stable and sustained stand on it by educational economists. Educational institution personnel and educational decision-makers are not interested in this cost because it is not associated with usable resources in the operation of institution.

In the present study, unit costs were also derived for private and institutional costs. These are:

**Institutional Cost per learner (unit cost of education) = Total expenditure/ Total enrolment**

**Private Cost per learner = Total expenditure/ No. of student included in sample**
However, it is necessary to note that all the above mentioned concepts of unit costs are nothing but average costs of education. The private cost was analysed for the type of institutions, gender and types of residence also. The type of residences is studied as— 1) hostel, 2) rental rooms and, 3) own residence.

Benefits:

There are many benefits of education like, consumption benefits for the individual, including the enjoyment of the educational process itself and investment benefits, such as greater productivity and, connected, higher pay, greater job satisfaction, and increased enjoyment of leisure. Blanchflower and Oswald (2000) show that, holding everything including income constant, education is associated with greater recorded levels of life satisfaction; their results also show that job satisfaction is typically highest among people with advanced levels of education. But only following types of benefits has been discussed in the present study:

Private Benefit:

A private benefit is estimated when the benefits and costs refers to the individual undertaking the investment. It is also known as internal benefit.

Direct Benefit:

To evaluate teacher education as an investment we need a measure of teacher education’s expected contribution to future levels of income or output. The obvious way in which teacher education contributes to future income is by imparting skills and knowledge to student teachers, thus improving the productivity of future teachers. If the efficiency of trained teacher is higher than that of the untrained teacher, this will be reflected in increased output and in higher life time earnings for the trained teachers.

Not only quantitative approach but to some extent to collect qualitative benefits (Perception of informants about the qualitative benefits to individual, Family and Society) schedule is used to collect cost and benefits.
3.7 METHODS OF EVALUATION

There are different ways of evaluating a teacher training programme. These methods are:

1. Net Present Value,
2. Benefit-Cost ratio,
3. Internal rate of return,
4. Pay-back period,
5. Discounted cash flow and

The procedure for estimating a rate of return for investment in education depends upon the availability of data and the degree of desired accuracy of data.

All these measures of evaluation have been used in to carry out cost-benefit analysis of education but they are less frequently used to evaluate education than the net present value and internal rate of return analysis technique. The net present value is a method of calculating the expected net monetary gain or loss from a programme by discounting all expected future cash inflows and outflows to the present point in time and the rate of return analysis is simply the rate of interest that equates the discounted present value of expected benefits and the present value of cost of any programme.

❖ Net Present Value

The NPV method reduces future streams of costs and benefits to a single number in which the costs and benefits are discounted to present terms. An NPV greater than zero indicates the program will generate returns beyond costs. The basic tool of cost benefit analysis is the net present value (NPV) formula:

\[
NPV = \sum_{t=0}^{T} \frac{B_t - C_t}{(1+R)^t}
\]

The left-hand side of this formula, NPV, shows the value to society of going ahead with a project, net of costs, and taking into account the time value of money.
The NPV rule says: accept all projects with a positive net present value, and reject the rest. If two projects are mutually exclusive, select the one with higher NPV. In cases where there are ‘embedded options’ (attractive flexibility features) within the project, a modified version of the NPV rule is needed (more on this later).

Apart from $\Sigma$, the notation on the right-hand side was as follows:

- $t (= 0, 1, 2, \ldots T)$ was the number of years from the present in which a benefit or cost is incurred;
- $B_t$ was the monetary equivalent of the benefit delivered by the project in $t$ years time;
- $C_t$ was the monetary equivalent of the costs incurred by the project in $t$ years time;
- $R$ was the discount rate; and $T$ was the number of years until the project is scrapped.

An additional term, based on $R$ and $t$, can be introduced here:

- $1/(1 + R)^t$ was the discount factor for benefits or costs $t$ years ahead.

The 10% discount rate was considered here for the calculation of NPV as all the literature supported that 10% rate was used for the developing countries.

**Internal Rate of Return**

The concept of the rate of return on investment in education is very similar to that for any other investment. It is a summary of the costs and benefits of the investment incurred at different points in time, and it is expressed in an annual (percentage) yield, similar to that quoted for savings accounts or government bonds.

Returns on investment in education based on human capital theory have been estimated since the late 1950s. Human capital theory puts forward the concept that investments in education increase future productivity. There have been thousands of estimates, from a wide variety of countries; some based on studies done over time and some based on new econometric techniques. All reaffirm the importance of human capital theory.
The internal rate of return of an investment opportunity is the rate of return which equates the present value of benefits and costs. Put another way, it is the discount rate that is just high enough to bring down the present value of benefits to the present value of costs. The decision rule associated with the internal rate of return is: accept all projects with an internal rate of return higher than your discount rate—or ‘hurdle rate’, as it is sometimes termed—and reject the rest. The advantages and disadvantages of this alternative decision rule can be brought out by reconsidering the two hypothetical projects.

There are essentially two classes of methods of estimation, one that uses the internal rate of return procedure, and another that approximates this procedure by means of fitting an earnings function to individual data sets (Mincer, 1974). Each of these classes is subdivided into the elaborate and short-cut methods, and the basic and extended-earnings function methods, respectively.

**Figure-3.2:** Taxonomy Methods of Estimation of Rate of Return to Education

<table>
<thead>
<tr>
<th>Estimation Class</th>
<th>Estimation Method</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal rate of return</td>
<td>Elaborate Method</td>
<td>Requires large data sets</td>
</tr>
<tr>
<td></td>
<td>Short-cut Method</td>
<td>Requires only average earnings by level of education</td>
</tr>
<tr>
<td>Earnings function</td>
<td>Basic – Mincerian</td>
<td>Requires large individual data sets</td>
</tr>
<tr>
<td></td>
<td>Extended Mincerian</td>
<td>Requires large individual data sets</td>
</tr>
</tbody>
</table>

The elaborate or full rate of return method refers to calculation of the internal rate of return based on individual age-earnings profiles that vary over time. The rate of return is the rate of interest at which the present value of expected benefits:

$$\sum_{t=a}^{n} \frac{E_t}{(1 + r)^n} - a$$
And the present value of costs:

$$\sum_{t=a}^{n} \frac{C_t}{(1 + r)^n - a}$$

Were equal, or in other words the rate of interest at which the difference between discounted benefits and costs was zero. That is:

$$\sum_{t=a}^{n} (E_t - C_t) / (1 + r)^n - a = 0$$

Where,

- n = the compulsory retirement age,
- a = age of entry to the teacher education programme,
- E = earnings after doing the teacher education programme,
- C = total cost of the teacher education programme,
- r = rate of interest and
- $\sum$ = sum of annual cost and benefits from year 1 to year n.

3.8 STATISTICS USED FOR ANALYSIS OF DATA

Completed schedules were analyzed by econometric angle. Cost Benefit analysis had been applied for data analysis and inferences drawn accordingly. Earlier researches of CBA said that for analysing cost benefit, Net Present Value and Internal Rate of Return techniques are useful. For NPV and IRR evaluation, here the researcher has taken initial cost of different nature of institution and male and female too; likewise the researcher took monetary benefits which students were getting at the recruitment time. Since these monetary benefits were not only for a year but also during life span. The researcher had been calculated NPV and IRR of working period of their work of 39 year (23 years to 62 years). As their salary will not remain the same whole life so 3% of increment rate added in their annual salary from entering age into the labor market till the retirement age. This increment rate is decided as in all the govt. jobs the rate of increment is 3%. Here the researcher used the 10% discount rate because many educational researches support this.
Beside econometric calculation some parametric test i.e. ANOVA to compare the groups more than two, students’ ‘t’-test was used to find out the significance of difference between two means and Pearson’s product moment correlation to find relationship among variables were used.

The data were analysed by SPSS version 21 and Microsoft Excel too.