CHAPTER III

3.1 Research Methodology
3.2 Hypothesis
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3.4 Tools
3.5 Verma's Test for Teaching Proficiency
3.6 Teaching Aptitude Test
3.7 Collection of Data
3.8 Statistical Techniques.
3.1 RESEARCH METHODOLOGY

Research does not end with the selection of the problem and its delimitation. The main part of a research project is to draw up a research design and plan the sample, tools and statistics to be applied.

"By Research we mean activity aimed at increasing our power to understand, predict and control events of a given kind. All three of these goals involve relationships between events or variables. We understand an event by relating it logically to others. We predict an event by manipulating the independent variables to which it is functionally related. Hence in the long run at least research must seek out relationships between variables." (1)

The above views expressed by Dr. N.L. Gage point out that Educational research is not a haphazard activity but a planned scientific procedure. Actually research is simply the process of arriving at a dependable solution to problems through the planned systematic collection, analysis and interpretation of data. Educational research can be defined as the systematic and scholarly application of the scientific method, interpreted in its broadest sense to the solution of educational problems. The term educational research

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1 Handbook of Research on Teaching by Dr. N.L. Gage, A Project of the American Education Research Association, Page 6.
should likewise be restricted to systematic studies designed to provide education with more effective means of attaining worthwhile educational goals.

In the present research project the research design is of Ex-Post-Facto cum field study. In the above design, the control of variable is not much required.

In the present study the independent variables are sex, faculty and experience (of 3 levels) and the dependent variables are teaching efficiency and teaching aptitude.

3.2 To establish relationships the following hypotheses have been framed for testing their significance:

(1) There is no significant difference in the groups according to sex.

(2) There is no significant difference in the groups according to faculty.

(3) There is no significant difference in the groups in regard to sex or faculty when the groups are divided according to experience.

(4) There is no relation between teaching efficiency and teaching aptitude in the different groups.

3.3 SAMPLE

In general research projects are conducted on a part of a population due to various reasons. This selection of a part of the population for study is called sampling.
There are many accepted methods of sampling depending upon the nature of the project. In this work stratified Random Sampling Method was used. It is stratified because there were conditions to fulfil before selection of the sample, viz. sex, faculty and experience.

First the schools were selected by random sampling by the lottery method. The list of schools selected is given in the appendix No.4.

A sample of 560 teachers were selected according to criterions. A larger sample than actual for study was selected only to meet the non-cooperation drop outs and incomplete responses by the teachers selected for the sample. The study has been conducted on a sample of 480. Out of it 240 are male and 240, female teachers of Intermediate College of Kanpur city. The above groups on the basis of sex were further divided into two groups of faculty - Arts and Sciences. From each faculty of each sex 120 teachers were selected. These were further subdivided on the basis of experience span into 3 groups viz. (1) upto 10 years, (2) 11 to 20 years and (3) 21 + years.

In the above subgroup according to experience the number of teachers in each subgroup is 40. The sample is described diagramatically with nomenclature of the groups.
<table>
<thead>
<tr>
<th></th>
<th>C</th>
<th>C₁</th>
<th>C₂</th>
<th>C₃</th>
<th>Total Males</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A₁ Males</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arts B₁</td>
<td>A₁B₁C</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>A₁B₁ 120</td>
</tr>
<tr>
<td>Science B₂</td>
<td>A₂B₂C</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>A₂B₂ 120</td>
</tr>
<tr>
<td>Total Experience</td>
<td></td>
<td>80</td>
<td>80</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td><strong>A₂ Females</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arts B₁</td>
<td>A₂B₁C</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>A₂B₁ 120</td>
</tr>
<tr>
<td>Science B₂</td>
<td>A₂B₂C</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>A₂B₂ 120</td>
</tr>
<tr>
<td>Total Experience</td>
<td></td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>A₂C 240</td>
</tr>
<tr>
<td>Total Males and Females</td>
<td>160</td>
<td>160</td>
<td>160</td>
<td>480</td>
<td>Grand Total</td>
</tr>
</tbody>
</table>
Table 3.2: The Distribution of the Samples of Teachers is as given below:

<table>
<thead>
<tr>
<th>Sex</th>
<th>Faculty</th>
<th>Experience</th>
<th>Number</th>
<th>Group Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>Arts</td>
<td>Upto 10 years</td>
<td>40</td>
<td>$A_1B_1C_1$</td>
</tr>
<tr>
<td>Male</td>
<td>Arts</td>
<td>11 to 22 years</td>
<td>40</td>
<td>$A_1B_1C_2$</td>
</tr>
<tr>
<td>Male</td>
<td>Arts</td>
<td>Over 20 years</td>
<td>40</td>
<td>$A_1B_1C_3$</td>
</tr>
<tr>
<td>Male</td>
<td>Science</td>
<td>Upto 10 years</td>
<td>40</td>
<td>$A_1B_2C_1$</td>
</tr>
<tr>
<td>Male</td>
<td>Science</td>
<td>11 to 20 years</td>
<td>40</td>
<td>$A_1B_2C_2$</td>
</tr>
<tr>
<td>Male</td>
<td>Science</td>
<td>Over 20 years</td>
<td>40</td>
<td>$A_1B_2C_3$</td>
</tr>
<tr>
<td>Female</td>
<td>Arts</td>
<td>Upto 10 years</td>
<td>40</td>
<td>$A_2B_1C_1$</td>
</tr>
<tr>
<td>Female</td>
<td>Arts</td>
<td>11 to 20 years</td>
<td>40</td>
<td>$A_2B_1C_2$</td>
</tr>
<tr>
<td>Female</td>
<td>Arts</td>
<td>Over 20 years</td>
<td>40</td>
<td>$A_2B_1C_3$</td>
</tr>
<tr>
<td>Female</td>
<td>Science</td>
<td>Upto 10 years</td>
<td>40</td>
<td>$A_2B_2C_1$</td>
</tr>
<tr>
<td>Female</td>
<td>Science</td>
<td>11 to 20 years</td>
<td>40</td>
<td>$A_2B_2C_2$</td>
</tr>
<tr>
<td>Female</td>
<td>Science</td>
<td>Over 20 years</td>
<td>40</td>
<td>$A_2B_2C_3$</td>
</tr>
</tbody>
</table>

Total: 480

Males - $A_1$ Arts - $B_1$ Experience upto 10 years - $C_1$

Females - $A_2$ Science - $B_2$ Experience 11 - 20 years - $C_2$

Experience 21 + years - $C_3$
3.4 TOOLS

The success or failure of a project depends on the efficiency of the tools utilised for collection of data when a standardised test is available it is logical to use it. "A standardised test is one in which the procedure, apparatus and scoring have been fixed so that precisely the same test can be given at different times and places" (2).

Standardised tests were available for both teaching efficiency and teaching aptitude. These were used for collection of data. (1) Teaching Efficiency: VTTP Verma's test for teaching proficiency constructed by Dr. M. Verma was used.

(2) For Teaching Aptitude: The T.A.T. (Teaching Aptitude Test) constructed by Dr. Jai Prakash and Dr. R.P. Srivastava and prepared by Dr. S.D. Kapoor was used. The details of these rests are given below.

3.5 VERMA'S TEST FOR TEACHERS PROFICIENCY

This test has been constructed and standardised by Dr. Mithilesh Verma, Head, P.G. Department of Research and Psychology, A.N.D. M.M. Mahavidyalaya (Kanpur University) Kanpur published by Psychomeasures.

CONCESSION OF THE TEST

The prestige of any academic institution depends on the quality of its teachers. It is the devotion and sacrifice on the part of the teachers that they

(2) 'Essentials of Psychological' by Lee S. Cronbach, Plarper Row, New York, p. 22.
command unique respect in society. The dearth of suitable teachers is a handicap in proper teacher learning process. The teaching profession is expected to be highly promising for the talented young generation to inspire in them and to instil in them desirable attitudes.

It is obvious that a teacher should be a genuine teacher. The most basic action in this direction is that each teacher has to discover himself/herself, has to be assessed by everyone involved in the teaching-learning system. This can make the teacher's role more effective and useful.

In 1953 the committee on the criteria of teacher effectiveness of the American Educational Research Association observed:

"The simple fact of the matter is that after forty years of research on Teacher's effectiveness during which a vast number of studies have been carried out. One can point to a few outlines that a superintendent of schools can safely employ in hiring a teacher or granting his tenure". (Ref. Remmer's et al. second report of the committee on criteria of teacher effectiveness Journal of Educational Research, 46, 641-657, 1953).

PURPOSE

VTTP is a sample as well as predictor. For novice in the training and the profession itself, the best works as predictor and for those who are already in the teaching profession it works as an assessor of the intentionally
enhanced or developed characteristics needed for effectivity of the profession. Thus it also works as a criterion for in-service promotions.

The VTTP is a ten to fifteen minutes objective test designed to provide a standard means of teaching proficiency or potentiality. The test is meant for the teachers of intermediate and higher classes. It consists of scales there are 25 items each scaled on 5 points and the typical performance has to be precisely marked on any point in each scale the author's own experience of more than 36 years helped in identifying exact characteristics that are necessary for effective performance in the teaching profession. The final format encouraged after due confirmation and verification of the criteria during the process of development and standardisation of the test.

VTTP AND ITS DEVELOPMENT

Verma's test of teachers proficiency (VTTP) assesses fairly the living component of the teaching profession under 3 ruberics (sub sets)

1. Teacher's personal characteristics TPC
2. Teacher's vocational characteristics TVC
3. Teacher's socio-political characteristics TSC
There can be enumerable characteristics under each heading, but the VTTP includes only the minimum number of pertinent ones sufficient enough to give an adequate indication of the present or predictive success in the profession of teaching.

The author did not try or thought it necessary to eliminate the factor of inter or intra correlations of the items and subsets.

3.6 TEACHING APTITUDE TEST

This test has been constructed and standardised by Dr. Jai Prakash and Dr. R.P. Srivastava and prepared by Dr. S.D. Kapoor. It has been published by the Psycho-Centre T-22 Green Park New Delhi 110016, India.

According to them the quality of a teacher in an educational system is a more important factor than all other educational factors put together. At present, in spite of the huge material accumulating in the field of psychological testing there is no standardised testing of aptitude test which could be helpful in the pretraining selection of teachers thus the construction and standardisation of the above test.

Aptitude is not necessarily an entity, but rather a constellation of entities the set of characteristics which enables one person to learn something, may even be different from that which enables another person to learn the same thing. Here in this test the term aptitude has been used in
its narrower sense, i.e. in terms of individual differences and traits. The aptitude here has been considered here as relative and not identical with concepts of ability, capability, capacity, proficiency, skill talent and genius etc.

TEACHING APTITUDE

Any one who is to become a teacher needs an intellect capable of grasping not only this subject matter and its place in the curriculum but also the aims and processes of education. Assuming that the candidate is bright, that he learns readily and assimilates thoroughly what he studies. The question still remains as to the likelihood that he can also teach others.

WHAT THIS TEST MEASURES

This test is meant for measuring the aptitude towards teaching profession. The scale has 10 subtests and a total of 150 items. Each sub-set contains 15 items. There is no time limit for the test but generally the examinees complete within 30 minutes. The test has the following areas belonging to each of the 10 sub-tests.

1. COOPERATIVE ATTITUDE

This trait has been used for measuring the cooperative attitudes of teachers towards their taught, society and the nation. This trait is an essential link for the relationship between the teacher and the taught, the school and the community and the society and the nation.
2. KINDLINESS

The items under this area have been used with regard to the general and particular attention of the teacher which is to be devoted for full growth and development of the personality of the pupil and to remove the hurdles and handicaps in the way, of growth and development of the pupil.

3. PATIENCE

The patience is an important attribute of teachers personality as he very often meets such a critical situation which needs patience and tolerance on his part.

4. WIDE INTEREST

The teacher is not supposed to stick to his work of teaching the subjects only but he is also an active participant in cocurricular activities outside the institution. He wants to see his taught growing physically mentally, culturally, socially and in other aspects of life.

5. FAIRNESS

This element has been taken in the test to measure the fairness and impartially of the teacher which are the most essential traits of the teachers personality.

6. MORAL CHARACTER

Moral status in the opinion of adults specially concerning their adherence to the adult standard have been tried to be seen through the items constituting this area.
7. DISCIPLINE

Discipline and problems of conduct in the classroom and elsewhere, and the methods employed in dealing with the problems are contained in this area.

8. OPTIMISM

This trait is more essential in the teachers personality as he is supposed to be always optimistic.

9. SCHOLARLY TASTE

A teacher is always a student in the acquisition of knowledge. He is always thirsty for knowledge and as such items in this subset measures scholarly taste.

10. EUTHUSIASM

Enthusiasm is an important element for the personality of a good teacher the importance of this trait has increased too much in the present stage.

PROPERTIES OF THE TEST

In the development of this test, the job psychographic method of Otis and Skinner was followed for the purpose of collecting and analysing information on various aspects of teaching profession. This yielded a list of attitude and traits which are considered important in the teaching job. The traits mentioned by Witty (1947), Bar (1948), Adaval (1952),
Menon (1949) were also considered. Finally 20 common traits, which were essential for the successful teacher, were selected for the first experimental draft. After the final item analysis only 150 items, which were highly scored were taken for the final draft.

**WEIGHTAGE TO ITEMS**

For every item the weights were determined by a variance and its covariance with other items. In this test, the weights of 3, 2 and 1 were assigned to the right responses of HA 'A' and 'A' and 'I' or 'HD' 'D' and 'I' were given to the wrong responses of 'HA' 'A' and 'I' or 'HD' 'D' as I resp. After this a scoring formula (Lindquist 1961) rights minus wrong

$$S = R - W$$

was adopted to obtain the correct scores the coefficient of correlation between the raw-scores of the test and the rated-scores was found to be 0.579 by product moment method and this justified the given weightages to a greater extent.

**STANDARDISATION SAMPLE**

The final test consisting of 150 statements was given to a large sample of 1050 pupil teachers under training in eleven Government Teachers' Training Institutions of Madhya Pradesh spread over in some eight districts. These teachers training institutions were divided into 3 grade above average, average and below average on the basis of their results in Public and home examinations, and from each of these grades 336, 300, 414 teachers were drawn respectively. The raw scores indicated that we were dealing with a normally distributed population.
The frequencies revealed the scores ranging from 51 (lowest) to 400 (highest) the highest frequency was 201 which belonged to the class interval of 201-250 scores nearly the middle step of the distribution. As a result the mean being 212 (with a standard deviation of 61.6) the median 213.6 and the Mode 217. The SEM (1.9) was also very small. The skewness obtained was only (0.09) and the kurtosis being 0.053 which were all insignificant. Such a nice normal distribution induces us to expect that the norms of this test would be applicable to a wider universe of teachers and the test can safely be used to assess the teaching aptitudes of all sorts of teachers working in the junior and senior higher secondary schools, even the very superior and the defective ones.

VALIDITY

A test is highly valid if it measures effectively the property it purports to measure. The validity of the test was secured by computing coefficient of correlation between scores on a the test and the assessment marks obtained in the final examinations the coefficient of correlation between the total marks of theory, practice teaching and craft, and the test score on 200 pupil teachers was .5 the obtained validity coefficient is quite satisfactory.

GROSS VALIDATION

The General psychological readers want to know how well the result hold good in other situations. The last was
administered to a group of 50 pupil teachers the results
was compared with the ratings of principal and four
lecturers of the same institution. The coefficient of
correlation came to .672 which is higher than .579
of the earlier experiment of group and revealed that the
final test is more developed and predictive than the
earlier experimental draft.

RELIABILITY

The reliability of the test was calculated by split-
half method using Guttman and Spearman-Brown Prophecy
formulas which yielded the coefficient of correlations as
.891 and .91 rest on a sample of 100 cases. The test-retest
method on a group of 50 teachers yielded a correlation of
.94. All these coefficients are high and therefore the
test has a good reliability the test has also a higher
degree of internal consistency and all the ten traits measures
independently their respective qualities irrespective of a
moderate over-lapping among four traits. The inter-element
correlations between the 10 components mostly centre around
.5 hardly any one of them is less than .5 and more than .547.

ADMINISTRATION OF THE TEST

The test has a reusable test Booklet of 8 pages containing
ten parts (or sub-tests) and a two-pages Answer sheet for
recording the answers. The answers to the first 75 items
are to be recorded on p. 1 of the answer sheet, i.e. parts 1
to 5, and on the back page 2 are parts 6 to 10 running from
items 76 to 150.

Necessary instructions and examples are included.

SCORING THE TEST

The T.A.T. is set up to permit the hand scoring of separate answer sheet. Separate transparent keys are available for scoring each page of the answer sheet and for right as well as wrong answer. In all there are 4 keys.

(1) Right answers on page 1
(2) Right answers on p.2
(3) Wrong answers on p.1
(4) Wrong answers on p.2 of the answer sheet.

Each of the 150 statements of the test has 5 alternative responses H.A., A.I., D.H.D.

As may be noted, the test has two sets of scoring keys. One for the Rights (R) and the other for wrong (W) score. Accordingly, the weights of 3, 2, 1 are given to the right responses of H.A, A and I or HD, D and I respectively whichever is correct as is visible through the blank circles of the Right keys similarly the weights of -3, -2 and -1 are assigned to the wrong answers of H.A, A and I or HD, D & I whichever is visible throughout the blank circles of wrong. Thus the scoring gives two sets of scores is right and wrong scores the correct score is obtained by subtracting the wrong scores from the Right scores (R.W.) and this remainder is an individually raw score.
Norms scores are given in the appendix 5 and 6.

3.7 COLLECTION OF DATA

The data was to be collected from teachers so the responders had to be tackled individually. As already expressed the first step was the selection of colleges from the list of 110 Intermediate colleges of Kanpur. 20 boys colleges and 25 girls colleges were selected. From these, a sample of about 260 to 300 teachers was selected from whom the requisite 240 was secured satisfactorily. Permission to take the teachers as samples was first got from the Principals. Then the teachers were contacted their agreement and cooperation having been assured the forms were distributed to them. The tests were not a very big problem as one of them (VTTP) was small and compact to compensate for the length of the T.A.T. All the usual delays and setbacks of course were there, but with patience and perseverance the data was collected.

3.8 STATISTICAL TECHNIQUES

After scoring according to the instructions in the manuals the tables were made for the 12 groups showing the 4 areas of efficiency and aptitude. There were 12 tables.

The calculations were done by computer. The following statistics were estimated:

(1) Mean, SD for all the groups.

(2) 'F' score (by A NOVA) for difference within the
groups. The results were assessed by the values of 'F' given below from 'F' table in Garrett:

\( df_{1,500} \ F_{1,500} \) at .05 level of significance = 3.86
\( df_{2,500} \ F_{2,500} \) at .05 level of significance = 3.01

(3) 't' values where 'F' was significant.

(4) Correlation between efficiency and aptitude in the different groups and subgroups.

The statistical formulae used were as follows:

(i) Arithmetic mean (A.M. ) \( = \frac{\sum X}{N} \)

where

\( X \) = value of variate,

\( N \) = size of sample.

(ii) Standard deviation

\( S.D. = \sqrt{\frac{\sum (X - M)^2}{N - 1}} \)

where

\( S.D. \) = standard deviation

\( X \) = variate value

\( M \) = mean of \( X \)

\( N \) = size of sample.
(iii) Variance and 'F'

\[
\text{Variance} = \frac{SS}{df}
\]

\[
\text{'}F\text{'} = \frac{V_m}{V_G}
\]

where

- \(SS\) = sum of squares
- \(df\) = degrees of freedom
- \(V_m\) = variance between means
- \(V_G\) = variance between groups.

(iv) \(t = \frac{D}{SED}\)

where

- \(D\) = Difference between group means = \(M_1 - M_2\)

\[
\text{SED} = \sqrt{\text{EMS} \left( \frac{1}{N_1} + \frac{1}{N_2} \right)}
\]

- \(EMS\) = Error mean square
- \(M_1\) = Mean of group 1
- \(M_2\) = Mean of group 2
- \(N_1\) = Size of group 1
- \(N_2\) = Size of Group 2
(V) Correlation

\[ r = \frac{N \sum XY - \sum X \cdot \sum Y}{\sqrt{(N \sum X^2 - (\sum X)^2)(N \sum Y^2 - (\sum Y)^2)}} \]

where

- \( r \) = coefficient of correlation
- \( X, Y \) = variate values
- \( N \) = size of sample.