CHAPTER - IV

METHOD OF INVESTIGATION

In any research, methodology is an inevitable part. According to Barr, Davis and Johnson (1953), after a problem is defined and delimited, the materials, methods and scope of the investigation should be outlined and described.

Methodology occupies a decisive role in any kind of research, as the validity and reliability of the findings depends upon the methods adopted. By methods, it means a range of approaches used in educational research to gather data, which are to be used as a basis for inference and interpretation, for explanation and prediction.

If methods refer to the techniques and procedures used in the process of data gathering, the aim of methodology is to describe and analyse these methods, throwing light on their limitations and resources, clarifying their presumptions and consequences relating to their potentialities to the twilight zone at the frontier of knowledge. It is to venture generalizations from the success of particular techniques, suggesting new applications and to unfurl the specific learning of logical and metaphysical principles on concrete problems, suggesting new formulations.

A suitable method helps the investigator to explore the diverse stands of the study and adequately measure them so as to satisfy the requirements and thus it is the means to an end.
Having specified the problem listing the objectives, formulating the hypotheses and providing appropriate review of relevant literature in the previous chapters, the present chapter is devoted to the description of the method of investigation followed in the study. The method adopted, tools and techniques used, development of the tools, their description, sample selected, procedure of data collection and statistical techniques adopted for analysing the data have also been discussed in this chapter.

4.1 Method Adopted

There are several methods of conducting research. Choice of the method of research is determined by the nature of problem. The method adopted should always be valid, reliable and appropriate to the nature of the problem under investigation and the kind of data that the problem demands.

The present study is intended to assess the level of creativity among the D.Ed teacher trainees. Some of the psycho-social factors also included with an objective to find out how these variables affect the creativity among the D.Ed teacher trainees in a positive way. Hence, the investigator adopted normative method for the present investigation in which the survey is the technique used. The word ‘normative’ is used because surveys are frequently made for the purpose of ascertaining which is normal or typical condition or practice.

The normative survey method is that method of investigation, which attempts to describe and interpret what exist at present in the form of conditions, practices, process, trends, effects, attitudes, beliefs, etc. It is concerned with some phenomena that are typical or normal.
According to Sukhia (1974) ‘the survey method determines present trend and solves current practical problems’. The survey is the type of research most widely used in the educational research. “Educational Surveys are particularly versatile and practical especially for an administrator, in that they identify present conditions and point to the present needs”.

Different types of surveys help to establish the status of the phenomenon under investigation. The purpose is to survey the present condition under investigation. The purpose is to survey the present conditions, understand the relationships and form the basis for future action on the base of findings. Surveys can be confined to fact-finding on large number of areas or they can be complex and sophisticated in design providing accurate findings. Adoption of the survey method in the present study helped the investigator to collect proper data from an adequate number of teacher trainees studying in various DIETs in Andhra Pradesh. Normative survey research may involve one or more of these elements in different situations. It is concerned, not with the characteristics of individuals but with the characteristics of the whole population.

4.2 Measurement of Variables

Out of the 12 variables investigated in the present study, 9 were socio-demographic variables, for which the information was gathered through a personal data sheet, 3 variables were measured with the suitable instruments. A brief description of the instruments is given in the following pages.
4.2.1 Creativity Test:

The creativity of the teacher trainees was measured in the present with the help of a battery of creativity tests conducted in Telugu Version prepared and standardized by Prof. A. Venkatarami Reddy (1989). The tests were developed in the line with those of Guilford (1962), Gatzels and Jackson (1962), Torrance (1962) and Wallatch and Kogan (1965). The items in the subjects which were chosen were taken into consideration based on their familiarity and relevance to the population on which they were to be used. The items were selected in consultation with the 6 judges drawn from the Department of psychology and Department of Education, Sri Venkateswara university, Tirupati, who were conversant with creativity tests.

The battery of creativity test consists of SIX activities. The four activities are related to verbal creativity and the remaining two activities are related to non-verbal creativity. The procedure for scoring verbal creativity and non-verbal creativity responses are based on fluency, flexibility and originality. The relevant responses are considered and counted as the fluency score of the item. The irrelevant and repeated responses are avoided. The Creative Test battery was given in the Appendix – A (Telugu version was given in the Appendix – E)

- Fluency was obtained by counting the number of relevant responses given by the subject.
- Flexibility was obtained by counting the number of categories into which the responses of the subject could be classified.
- Originality was derived from the relative infrequency or uniqueness of the responses of the subjects.
- Composite scores was obtained by adding the scores of the subjects on fluency, flexibility and originality.
Thus, the total scores for all the six activities are tabulated and evaluated for analyses and interpretation. A brief description of the tests is presented in the following paragraphs.

i. Activity – 1: Unusual Uses:— Basically the unusual test which is used in almost all creativity test batteries requires the subjects to redefine the object after thinking about the various ways in which it can be used. Common things like brick, wooden stick and cotton were used as stimuli to let the subject’s thinking in different directions.

ii. Activity – 2: Common Problems:— The children were provided with 4 pairs of things and they were asked to suggest as many different ways in which the two things in a given pair of objects were similar. They were to generate various similarities between the two objects in each of the four pairs.

iii. Activity – 3: Consequences:— In this test the subjects were confronted with certain hypothetical situations and they were required to think of all possible consequences of these hypothetical situations.

iv. Activity – 4: Product Improvement:— The product improvement task is another complex task, which assess the ability of the subjects to think of different kinds of defects and ways of improving the given objects. They were given a list of 4 objects and asked to suggest as many ways of improving each of them. They were told not to worry about the practicability of the suggested improvement.
v. **Activity – 5: Line Meanings:** This task contained eight figures each of which was continuous line of particular sort. The subjects were to think of different interpretations appropriate to the form of each of the given lines. Each line was a single unit unlike the discrete elements that comprised the patterns in the pattern meaning test.

vi. **Activity – 6: Circles:** In this task the subjects were to construct meaningful figures with the given circles as base by drawing lines inside and or outside each of them. After completing each figure, they were required to name them.

(i) **Validity:**

There are various methods of estimating the validity of a measuring instrument. The following types of validity were established for the attitude towards creativity test.

a) **Content validity:** This form of validity is established by evaluating the relevance of the test items individually and as a whole. Each item should be a sampling of that aspect which the test purports to measure and taken collectively, the items should constitute a representative sample of the variable that is measured. In the construction of the present instrument, items were collected from a large number of D.Ed teacher trainees. They were also supplemented by a review of related literature and by interviewing selected teacher trainees to make sure that all possible items were included. Thus, it can be reasonably assumed that the inventory has content validity.
b) Item validity: There are numerous procedures by which the item validity can be determined. The discrimination power of each item was established. Thus, each item of the creativity test is valid, establishing the validity of the instrument in discriminating the high and low groups on the aspect that is measured viz., creativity score.

The other form of item validity is the item-total correlation. It means, testing each item whether it is measuring the same aspect as the total test. Only those items which are possessing significant correlation with the total scale were included in the final scale. Thus, the validity of each item as well as total scale was established.

c) Intrinsic validity:- Guilford (1954) defined "Intrinsic validity is the degree to which a test measures what it measures". This also gives how well the obtained scores measure the test's true score component. The square root of its reliability gives this validity index. Thus, the intrinsic validity of the creativity test was 0.959.

d) Construct Validity:- Construct validity of a test measures particular characteristics of the individual taking the test. A test is valid from the construct point of view, if it can indicate the individual's actual achievement of instructional objectives. All the items in the creativity scale are based on the objectives of instruction. Hence, there is construct validity for the creativity test.

e) Concurrent validity and predictive validity:- In a situation of some observable criterion, the scale's validity can be investigated by seeing how good an indicator it is. This approach leads to two categories of validity (i.e) 'Predictive Validity' and 'concurrent validity'. Predictive validity is concerned with how the scale can forecast a future criterion and concurrent validity with how well it can describe a present one. The results in the succeeding chapter show that the creativity test has both concurrent and predictive validities.
(ii) **Reliability:**

Split- Half method was applied to calculate the reliability of the creativity test. The scores on the odd and even numbered items were correlated using Pearson’s Product moment correlation formula. This gave the reliability of the half test. The reliability of the half-test, thus obtained was 0.852. This was correlated for full length of the test by Spearman Brown prophecy formula. The reliability thus obtained was 0.919.

4.2.2 **Teaching Competency Scale**

Teacher competence can be identified from several sources using different approaches. The most comprehensive list of sources has been provided by Hall and Jones (1976). According to them, competencies can be identified from:

i. Study of existing lists
ii. Translation of teacher education course
iii. Taxonomic analysis
iv. Responses of clients including pupils and community
v. Task analysis
vi. Judgement of professionals / practitioners
vii. Deduction from theoretical constructions

Borich and Fenton (1977) have added observation and experimental studies also as sources for identification of competencies.

The accumulated literature might refer to the findings from research, research abstracts, course on teacher education and theories and models proposed on teaching. Some researches (Grymes, 1990; Sheelendo, 1992; and Sale, 1995) have chosen the procedure of listing the competencies from the
objectives of teaching and teacher education courses and also the tasks performed by a teacher. Basically, this approach is one of identifying the competencies expected in a teacher in relation to teacher roles and functions as defined for teacher training.

Another common source for identifying competencies is the judgement of experts/professionals/practitioners. In one of the earliest attempts on determining the essential competencies of a teacher the perception of a group of experts consisting DIET faculty members, headmasters, senior teachers were taken as the basis.

Keeping in view the sources/approaches mentioned by various educationalists and the nature of sources selected by researchers, it was considered essential to choose more than one source for the present study. The reason being is that this would enable arriving at a comprehensive list of teacher competencies.

(i) Adoption of the Teaching Competency scale

On examination of the various instruments developed to measure teaching competency scale, the investigator adopted the General Teaching Competency Scale (GTCS) developed by Dr. B.K. Passi and Dr. M.S. Lalitaha (1977) for the purpose of the present study. This scale consists of 21 items related to FIVE constructs of covering the elements of teaching competency among trainees and teachers viz., (1) Planning, (2) Presentation, (3) Closing, (4) Evaluation and (5) Managerial. The investigator identified that personal growth is also an important area in influencing the teaching competency among the trainees and added 5 standard items along with the scale. The SIX constructs areas along with their item numbers of teaching competency scale are presented in table-2. A copy of the English version of the GTCS is given in Appendix-B. (Its Telugu version is given in Appendix -F).
(ii) Scoring

The adopted GTCS is a Seven-point rating scale measuring the use of the skill by the teacher in the classroom corresponding to each item ranging from 1 for ‘Not at all’ to 7 for ‘very much’. The sum ratings against all the 26 items constitute the score on General Teaching Competency Scale of the subject being observed. The minimum and maximum scores of the scale is 26 and 182 respectively. *Higher score indicates high teaching competency and vice-versa.*

(iii) Validity of the scale

The Teaching Competency Scale has content validity since at every stage of its development; discussions were held with teacher and teacher educators with regard to the different teaching skills included and their behavioural components.
The scale has factorial validity. This was established by Rama (1979) in her doctoral study on Factorial Structure of teaching competencies among secondary school teachers. The investigator developed intrinsic validity that: 0.889.

(iv) **Reliability**

Since this is an observation tool, the more appropriate type of reliability is the inter-observer reliability. This scale has been used for doctoral research (Joshi, 1977 and Passi, 1977) and the reported inter-observer reliability coefficients range from 0.85 to 0.91. Inter-observer reliability can be better established when the observers train themselves for using the teaching competency scale. The investigator also found split-half reliability for the full test as in the earlier case: 0.792

### 4.2.3 Intelligence Scale - SPM (Raven’s Standard Progressive Matrices)

For measuring the intelligence many tests are available. One test that is frequently used is Raven’s standard Progressive Matrices. This test has several salient features over other tests. It could be administrated to a large group of individuals at the same time. This saves considerable time. What is required in the present investigation is to establish mental maturity and not specific abilities like verbal ability, numerical ability, spatial ability etc. Hence, this test has been considered suitable and used in the present investigation. Further, it is a culture-free test and capable of enthusing subject.

(a) **Adoption of the Intelligence scale**

Keeping in view of the principles and important characteristics of good opinionnaire and on the examination of the various instruments developed to measure the intelligence of different personals.
The SPM consists of a series of sixty usually printed problems as booklet form with one problem presented on each page. Each is a possible answer and all of them are of shape and size to fit into the blank space in the matrix, but each with a different design. The subject is to choose the one alternative, which because of its design will complete the pattern in the matrix.

The sixty problems are divided into five sets (A, B, C, D and E) of twelve each. In each set the first problem is as nearly as possible self-evident. The problems which follow become progressively more difficult. The scale is given in Appendix-C.

The principle to be educated in

Set – A is a continuous pattern

Set – B is an analogy between pairs of figures

Set – C is a progressive alternation in pattern

Set – D is a permutation of figures and

Set – E is a resolution of figures into their constituent's parts.

(b) Administration of SPM: The test was administrated in this investigation to 20 students at a time as a power test with no time limits. In the Raven’s Standard Progressive Matrices, 6 alternative answers are given to each question. The students are directed to read the instructions at the beginning. The students are motivated to give only one answer for each question. The examiner also tries to make them understood. However, the time of completing the test was noted on the answer sheets. The usual time taken was between 40 to 50 minutes. A few students took over 60 minutes to complete the test. After the students finished answering the test, the answer sheets and SPM books were collected.
(e) Scoring:- After collecting the answer sheets, the scoring is done with the help of answer key. The total raw score of each test is marked on the top of the answer sheet.

(d) Validity:- Validity refers to the extent to which a test measurement what we actually wish to measure. Two forms of validity is used for the test construction viz., the internal validity and the external validity. The internal validity of a tool is its ability to measure what it aims to measure we shall deal with this internal validity. The procedure for determining the test validity under two categories designated as content validity and concurrent validity.

**Content Validity**:- Logical validity is another name for this content validity. It is the extent to which a measuring instrument provides adequate coverage of the topic under study. If the instrument contains a respective sample of the universe the content validity is good.

**Concurrent Validity**:- The relation between test scores and indices of certain status obtained at approximately the same time, is known as concurrent validity.

The present intelligence scale was validated by the author.

(e) Reliability

Reliability has to do with the accuracy and precision of a measurement procedure. A test score is called reliable when we have reasons for believing the score to be stable and trustworthy. The reliability of the Intelligence was obtained by (i) Test-Retest Method and (ii) Internal Consistency Method.

Test-Retest Method:- The scale was measured for its test-retest reliability by administering upon a group of teachers and established the reliability for each category.
4.2.4 Personal data sheet:

The information regarding the region, gender, group of study, medium studied, parental education, parents occupation, parental income, interest in the course of the D.Ed teacher trainee, under which locality they are residing was obtained from a carefully designed personal data sheet. The personal data sheet is given at the beginning of the all inventories. The personal data sheet is given in the Appendix – D.

4.3 Sample and Design:

The problem is aimed at investigating the general level of creativity and the teaching competency and intelligence and the relationship among these variables among the D.Ed teacher trainees of 7 districts of THREE regions of Andhra Pradesh.

In selecting the sample for the study, the researcher selected 3 regions viz., Coastal Andhra, Telangana and Rayalaseema from Andhra Pradesh through stratified random sampling technique. There are 23 Districts Institutes of Education and Training (DIETs) centers in A.P offering Diploma in Education (D.Ed) course. The curriculum, the academic schedule and examination pattern are unique in all the districts. 3 DIETs from Coastal Andhra (Guntur, Prakasam and Nellore), 2 DIETs from Telengana (Karimnagar and Nalgonda) and 2 DIETs from Rayalaseema (Kadapa and Chittoor) were selected at random. All the 7 DIETs selected are managed by the Government of Andhra Pradesh. The study is confined to the D.Ed – II year teacher trainees who received complete teaching skills are treated as subjects for the present study.

The distribution of the sample of D.Ed teacher trainees selected for the final study under different categories is shown in the following table.
Table - 3
The distribution of the sample of teacher trainees selected for the Final study.

<table>
<thead>
<tr>
<th>Region</th>
<th>Boys</th>
<th>Girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Urban</td>
<td>Rural</td>
<td>Urban</td>
</tr>
<tr>
<td>Telangana</td>
<td>14</td>
<td>77</td>
<td>43</td>
</tr>
<tr>
<td>Rayalaseema</td>
<td>21</td>
<td>60</td>
<td>40</td>
</tr>
<tr>
<td>Coastal Andhra</td>
<td>29</td>
<td>98</td>
<td>34</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>64</strong></td>
<td><strong>235</strong></td>
<td><strong>117</strong></td>
</tr>
</tbody>
</table>

4.4 Administration of the Test

The investigator personally visited all 7 DIETs included in the sample with the prior permission from the concerned Principals. A good rapport was developed with the D.Ed teacher trainees as explained earlier. They were explained the purpose and importance of the study as a matter of motivation.

The D.Ed teacher trainees were given a copy of all the instruments viz., Creativity test, teaching competency scale, Ravens Standard Progressive Matrices scale and personal data sheet and requested them to respond to all parts of the booklet of instruments and to all items without leaving any part or any item. Though all the above instruments were self-administrating, they were explained clearly each of them. Sufficient time was given to them to respond the items.
4.5 Statistical techniques used

The statistical techniques used and the purpose for which they were used are given below:

<table>
<thead>
<tr>
<th>Name of the Statistical Technique used</th>
<th>Purpose for which they Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Correlation</td>
<td>To test the significant relationship between level of creativity scores and with the different personal and demographic variables.</td>
</tr>
<tr>
<td>2. 't' test or Critical Ratio</td>
<td>To test the significant difference of Mean's pertaining to the level of attitude towards values scores to different independent variables.</td>
</tr>
<tr>
<td>3. 'F' test or ANOVA test</td>
<td>To test the significant difference of means of more than two groups of teacher trainees pertaining to the level of attitude towards value scores to different independent variables.</td>
</tr>
<tr>
<td>4. Chi-Square test</td>
<td>To find the association of different levels of values on the independent variables.</td>
</tr>
</tbody>
</table>
4.6 Analyses of the data

Thus the total scores obtained by each of 600 D.Ed teacher trainees on all the variables were computed. The data was analysed using relevant statistical techniques like ‘t’ test, ANOVA, Chi-square test to find out whether the differences in the independent variables accounted for significant differences in the dependent variables. The usual levels of significance viz., 0.05 and 0.01 levels were employed to test the significance of the obtained values.

The descriptive statistics (Means and Standard Deviations) of creativity test scores were used to present background characteristics like gender (male and female), locality (rural and urban), etc. The product moment correlation was used to measure the significant relationship between creativity of the D.Ed students in relation to their personal and demographic variables.

‘t’- test or Critical ratio was used to test the significance difference of means pertaining to the creativity scores of the teacher trainees to different independent variables.

‘F’ -test or Analyses of Variance was used to test the significant difference of means of more than two groups of teacher trainees pertaining to the creativity scores to different independent variables.

All these statistical analyses were carried out using SPSS statistical software.

The obtained numerical results were also adumbrated by graphical representation wherever necessary. The next chapter deals with the analysis of the data in detail.
CHAPTER - V
RESULTS & DISCUSSION