CHAPTER 4

RESEARCH DESIGN AND METHODOLOGY
CHAPTER - IV
RESEARCH DESIGN AND METHODOLOGY

4.1 Introduction
4.2 Research Method
4.3 Population of the Study
4.4 Sample of the Study
4.5 Planning for Construction of Teaching Aptitude Test
4.6 Method of Data Collection
4.7 Data Analysis
4.8 Conclusion
CHAPTER - IV
RESEARCH DESIGN AND METHODOLOGY

4.1 INTRODUCTION:

Research in teacher education has assumed importance in the present junctures when teacher education has been taken lightly. Research in education also require careful planning. Planning is essential not only in research project but in all spheres of life. Planning determines the quality or success of any task. Lack of planning may lead the investigator to innumerable and insurmountable difficulties in all stages afterwards.

Gay and Airasain\(^1\) (2000) says that a research plan should give attention to these elements:

1. Introduction, including statement of the problem, review of the literature, and statement of the hypothesis.
2. Method, specifying participants, instruments, materials/apparatus, design of the study and procedure.
3. Data analysis.
4. Time schedule.
5. Budget.

Thus to avoid waste of time, waste of money and possible frustration that may arise out of failure to achieve desired results, previous planning of the whole research project is very essential. In the present chapter planning of the construction of a test as well as related studies is described in detail. Thus the present chapter deals with Research Methodology and Procedure.

4.2 RESEARCH METHOD:

There are three major methods of research in education: (1) Historical research (2) Experimental research and (3) Descriptive research (Kothari, 2004)\(^1\)

Historical research is the study of past phenomenon for the purpose of gaining a better understanding of present institutions, practices, trends and issues. The experiment is a quantitative research method for establishing cause and effect relationship by applying an independent variables on dependent variables.

Descriptive research is done to depict people, situations, events, and conditions as they currently exist. Descriptive research is nonexperimental and can be either qualitative, quantitative, or a combination of the two. Descriptive research may be classified in the three categories like - Survey Research, Interrelationship Research and Development Research.

Survey studies may take different forms depending upon the scope, nature and purpose of the problem under investigation. They may be broad and narrow in scope. Survey data may be collected from every unit of a population or from a representative sample.

The core of present study was to collect data, analyse them, and make appropriate inferences based on the collected data, so the method employed was survey method. Reliability, validity and norms were also established for the present test that indicates the present study was carried out with normatives survey research method.
4.3 POPULATION OF THE STUDY:

A population refers to any collection of specified group of human beings or of non-human entities such as objects, educational institutions, time units, geographical areas, prices of wheat or salaries drawn by individuals. Some statistician call it universe. The population is properly defined so that there is no ambiguity as to whether a given unit belong to the population. If a population is not properly defined, a researcher does not know what units to consider when selecting the sample.

There are more than 420 grant-in-a-ids and self-fianance colleges in the state of Gujarat having medium of instruction Gujarati. Thus the population of the present study is all the teacher trainees studying in the B.Ed. colleges of the Gujarat state in the academic year 2009-2010 and 2010-11.

4.4 SAMPLE OF THE STUDY:

The representative proportion of the population is called a sample. In other words sample is a subgroup of people, animals, or objects selected to represent the much larger population (in its entirety) from which it is drawn. In a survey type research, it is not impossible but it is beyond the capacity of any researcher to collect the data on population. Researcher should take maximum care in selecting sample to be included in the research from the population. It is expected from the researcher that the sample should be as far as possible unbiased and representing most of the characteristics of population. A good sample must be as nearly representative of the entire population as possible and ideally it must provide the whole of the information about the population from which the sample has been drawn.

The various method of selecting sample are categorized as either probability sampling or nonprobability sampling techniques which are summarized in the following figure 4.1.

![Methods of Sampling Diagram](image)

**Figure 4.1 : Methods of Sampling**

Here is given a very brief description of each method:

- **Probability Sampling**
  - Simple Random Sampling
  - Stratified Random Sampling
  - Cluster and Multi-stage Sampling
  - Systematic Sampling

- **Nonprobability Sampling**
  - Convenience Sampling
  - Judgemental Sampling
  - Snowball Sampling (Network/Chain sampling)
  - Quota Sampling

(54)
Probability Sampling:

Probability sampling is a category of sample selection procedures in which one can state the probability (likelihood) of each member of the population being selected for the sample and in which there is a constant probability of selection for each member of the population.

Nonprobability Sampling:

Nonprobability sampling is a sampling procedure in which the probability of inclusion for each member of the population cannot be specified. It is used when probability sampling is not feasible. Types of nonprobability sampling include convenience sampling, judgement sampling, snowball sampling, and quota sampling.

Types of probability sampling include random sampling, stratified sampling, cluster sampling, and systematic sampling.

Stratified Random Sampling:

This procedure should be applied when the population is composed of sub-group of different sizes. The total sample should include individuals drawn from each stratum in accordance with the sizes of the sub-groups within each stratum the sampling in random.

B.Ed. Colleges were selected for final run of the test by stratified random sampling technique and trainees were selected by stratified random cluster sampling technique. First of all, Gujarat state was divided into five zones.

(1) North Zone (2) South Zone (3) Central Zone (4) East Zone (5) West Zone

In North Zone : Banaskantha, Patan, Mahesana and Gandhinagar districts, In South Zone : Navsari, Narmada, Bharuch and Dang District, In Central Zone : Anand, Vadodara Dahod, Godhra, Panchmahal, In East Zone : Kheda, Ahmedabad, Mahemdabad districts, In West Zone : Junagadh, Rajkot, Amreli, Kachch, Bhavnagar and Surendranagar districts were randomly selected. Eight colleges from each zone were randomly selected, in which four colleges from rural areas and four from urban areas. Total 20 colleges from rural areas and 20 colleges from urban areas were selected by stratified random method. A detail about sample selection in final run is shown in table 4.1

Table 4.1
Sample for final testing

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Area</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rural</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td></td>
<td>Graduate</td>
<td>Post Graduate</td>
</tr>
<tr>
<td>Science</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Commerce</td>
<td>–</td>
<td>100</td>
</tr>
<tr>
<td>Arts</td>
<td>125</td>
<td>250</td>
</tr>
<tr>
<td>Total</td>
<td>225</td>
<td>450</td>
</tr>
</tbody>
</table>

(55)
Total 40 colleges were selected by stratified random sampling technique and total 2950 B.Ed. trainees were selected by stratified random cluster sampling technique for final run of the test. Which is discussed in detail in chapter-5.

4.5 PLANNING FOR CONSTRUCTION OF TEACHING APTITUDE TEST:

4.5.1 Selection of components for the test:

After studying the researches, tests, inventories etc. mentioned earlier in chapter 3, the investigator also discussed the problem with some experts in the field of education and with his guide. Finally the investigator prepared a list of twenty-nine components supposed to be contributing to success in teaching profession.

The investigator initiated with a list of twenty-nine components which are mentioned below:

1. Knowledge of subject-matter
2. Mental Ability
3. General Knowledge
4. Behaviour Towards Children
5. Professional Information
6. Interest in Reading
7. Attitude Towards Society
8. Adaptability
9. Industrious
10. Sincerity
11. Attitude Towards Life
12. Interest in Profession
13. Health
14. Personal Appearance
15. Interest in Educational Activity
16. Knowledge of Psychology
17. Personality
18. Character
19. Teacher-Pupil Relation
20. Interest in Music
21. Knowledge of Yoga
22. Beauty Sight
23. Knowledge of Computer Technology
24. Communication Skill
25. Logical Presentation
26. Research Attitude Approach
27. Feeling/Emotional
(28) Honesty

(29) Knowledge of Statistics

It was not possible to incorporate all these components which are essential for a good teacher. To select factors or components which seem to contribute success in teaching it was decided to seek opinions from the experts of the field. The researcher got a list of these twenty-nine components printed on a paper and mailed it with a forwarding letter to 200 experts. (copy of the forwarding letter and the component list and experts list are presented in appendix A). Professors, Readers in Education departments, Principals of education college, Teacher Educators, Principals of secondary schools and M.Phil. students were requested to rank these components in order of priority and give percentage to each component. They were requested to rank the most important component as 1 and other in order of their importance as 2, 3, 4, 5 and so on. The last rank was seven to be assigned to the least important component.

The researcher received a good response from all the five groups of experts as shown in Table 4.2.

Table - 4.2

Number of experts’ response on components-List

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Persons from different fields</th>
<th>Letter sent</th>
<th>No. of Experts who have given response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Professors</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>Readers</td>
<td>20</td>
<td>18</td>
</tr>
<tr>
<td>3.</td>
<td>Principals of Education College</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>4.</td>
<td>Teacher Educators</td>
<td>100</td>
<td>75</td>
</tr>
<tr>
<td>5.</td>
<td>Principals of Schools</td>
<td>30</td>
<td>28</td>
</tr>
<tr>
<td>6.</td>
<td>M.Phil. Students</td>
<td>22</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>200</td>
<td>160</td>
</tr>
</tbody>
</table>

Figures in Table 4.3 shows that the proportion of return was about 80 percent.

The investigator got 160 letters ranked back. She went through all the responses carefully to check whether all have responded all items. She found only 108 respondents have given responses completely. So finally, only 108 respondents have been counted for the further research.

Here, ranks were converted into scores. The conversion from ranks into scores was made in the following manner. Rank one was assigned a score of 7, rank two was assigned a score of 6. Thus scores were assigned in descending order so that rank 7 class rank 1 was given to score ones. There were 108 experts. Total scores and averaged scores were calculated for each of the seven components out of 29. Again ranks were assigned to average scores.

Experts’ responses on component list and average score are given in table 4.3
# Table - 4.3
Experts’ Responses on List of Components

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Components</th>
<th>Total Score</th>
<th>Average Score</th>
<th>Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Knowledge of Subject-Matter</td>
<td>1463</td>
<td>13.55</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Mental Ability</td>
<td>1398</td>
<td>12.94</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>General Knowledge</td>
<td>1210</td>
<td>11.20</td>
<td>8</td>
</tr>
<tr>
<td>4.</td>
<td>Behaviour Towards Children</td>
<td>1394</td>
<td>12.90</td>
<td>3</td>
</tr>
<tr>
<td>5.</td>
<td>Professional Information</td>
<td>1210</td>
<td>11.20</td>
<td>8</td>
</tr>
<tr>
<td>6.</td>
<td>Interest in Reading</td>
<td>1220</td>
<td>11.30</td>
<td>7</td>
</tr>
<tr>
<td>7.</td>
<td>Attitude Towards Society</td>
<td>1188</td>
<td>11.00</td>
<td>10</td>
</tr>
<tr>
<td>8.</td>
<td>Adaptability</td>
<td>1296</td>
<td>12.00</td>
<td>4</td>
</tr>
<tr>
<td>9.</td>
<td>Industrious</td>
<td>1080</td>
<td>10.00</td>
<td>12</td>
</tr>
<tr>
<td>10.</td>
<td>Sincerity</td>
<td>864</td>
<td>8.00</td>
<td>16</td>
</tr>
<tr>
<td>11.</td>
<td>Attitude Towards Life</td>
<td>1091</td>
<td>10.10</td>
<td>11</td>
</tr>
<tr>
<td>12.</td>
<td>Interest in Profession</td>
<td>1242</td>
<td>11.50</td>
<td>5</td>
</tr>
<tr>
<td>13.</td>
<td>Health</td>
<td>864</td>
<td>8.00</td>
<td>19</td>
</tr>
<tr>
<td>14.</td>
<td>Personal Appearance</td>
<td>918</td>
<td>8.50</td>
<td>15</td>
</tr>
<tr>
<td>15.</td>
<td>Interest in Educational Activity</td>
<td>1240</td>
<td>11.48</td>
<td>6</td>
</tr>
<tr>
<td>16.</td>
<td>Knowledge of Psychology</td>
<td>1199</td>
<td>11.10</td>
<td>9</td>
</tr>
<tr>
<td>17.</td>
<td>Personality</td>
<td>867</td>
<td>8.02</td>
<td>15</td>
</tr>
<tr>
<td>18.</td>
<td>Character</td>
<td>692</td>
<td>6.41</td>
<td>17</td>
</tr>
<tr>
<td>19.</td>
<td>Teacher-Pupil Relation</td>
<td>1221</td>
<td>11.31</td>
<td>7</td>
</tr>
<tr>
<td>20.</td>
<td>Interest in Music</td>
<td>346</td>
<td>3.20</td>
<td>20</td>
</tr>
<tr>
<td>22.</td>
<td>Beauty Sight</td>
<td>346</td>
<td>3.20</td>
<td>20</td>
</tr>
<tr>
<td>23.</td>
<td>Knowledge of Computer Technology</td>
<td>1080</td>
<td>10.00</td>
<td>12</td>
</tr>
<tr>
<td>24.</td>
<td>Communication Skill</td>
<td>1080</td>
<td>10.00</td>
<td>12</td>
</tr>
<tr>
<td>25.</td>
<td>Logical Presentation</td>
<td>908</td>
<td>8.40</td>
<td>14</td>
</tr>
<tr>
<td>26.</td>
<td>Research Attitude Approach</td>
<td>465</td>
<td>4.31</td>
<td>18</td>
</tr>
<tr>
<td>27.</td>
<td>Feeling/Emotional</td>
<td>1014</td>
<td>9.39</td>
<td>13</td>
</tr>
<tr>
<td>28.</td>
<td>Honesty</td>
<td>465</td>
<td>4.30</td>
<td>18</td>
</tr>
<tr>
<td>29.</td>
<td>Knowledge of Statistics</td>
<td>1080</td>
<td>10.00</td>
<td>12</td>
</tr>
</tbody>
</table>

The highest average score assigned to a component shows the greater contribution of that component for the successful career in the teaching profession. The above table indicates the order of importance given to various traits by the experts for successful standing in the teaching profession. It was decided to select first six components from the total 29 components for the construction of Teaching Aptitude Test. These components are placed for the first six ranks. All these components are also incorporated in the previously prepared Teaching Aptitude Tests.

Thus six components were selected for the construction of the teaching aptitude test. It was decided to divide the test battery into subtests. The test was divided into two sections.
(1) Section - I : Which includes
1. Mental Ability
2. Adaptability to New Situation
3. Behaviour towards children
4. Interest in Profession
5. Interest in Educational Activity

In this study components 4 & 5 were grouped together so now section-1 includes four components like 1. Mental Ability 2. Adaptability to New Situation 3. Behaviour towards children 4. Interest in Profession and Educational Activity.

The fifth component is regarding the knowledge of subject matter which is given below as section-II.

(2) Section - II : Which includes Ten School Subjects
2. Sanskrit 7. Maths
3. Hindi 8. Economics
4. English 9. Commerce
5. Social Science 10. Account

4.5.2. Section - I : Description of Items in each Sub Test :

The detail description of both the sections are as follow :

4.5.2.1. Subtest-1 : Mental Ability : Sandiford and his colleagues arrived at the conclusion that ability to teach is not closely related to intelligence above that necessary for college graduation. In other words, if a student had sufficient intelligence to complete his University course successfully higher intelligence did not seem to be necessary of value in teaching. This sub-test, therefore, is designed to measure the normal intelligence of teachers. It includes items on number series, classification & figure analogy.

4.5.2.2. Subtest-2 : Adaptability to New Situation : The teacher's main work is to create environment for conducive to teaching in a class-room and thus to come in close contact with the children. He has to organize and take part in co-curricular activities also. Here also he has to come in close contact with the children, but in quite a different capacity and different mind, sphere. He has to adapt himself to this new situation. Moreover, he has to maintain very cordial relations with his superiors and with his colleagues. He will come in contact with the children's parents. He has to maintain good parent-teacher relationship. The society expects him to be a good social worker. Thus he will come in close contact with people having different personality in the community. If he has no favourable attitude towards the community or has no optimistic attitude towards life, he will perhaps be unable to adjust himself with different people in the community and will not, therefore, be able to discharge certain duties of a good teacher. Through this sub-test, it is tried to measure the adaptability of the prospective teacher. A number of items, based on imaginary situations are constructed and the testee is required to answer the items to show how he will adjust himself to the
expected to opine about the test-items, instructions and components which were proper and capable
to measure Teaching Aptitude of B.Ed. trainees. Opinions were also sought from the experts on
corresponding or not corresponding items to the components. They were further asked to suggest the
items which strongly related to the components and capable to measure the teaching aptitude.

4.5.6 Pre-pilot tryout:
The purpose of this tryout was not to get quantitative data but to get acquainted with administra-
tion of the test, to check the effectivness of instructions and to find out loop holes if any in the
test items. The another objective of the pre-pilot testing was to improve the language of the test items
as well as instructions if necessary. It was decided to administer the test on 160 trainees from nine
B.Ed. Colleges.

4.5.7 Pilot Tryout of the Test
The main aim of pilot tryout of the test is item analysis which is discussed in detail
chapter-5.

4.5.8 Final run of the Test:
To establish norms and to find out reliability and validity of the test, it was decided to
administer the test on a big sample selected from various B.Ed. colleges situated in different districts
of Gujarat State. It was decided to administer the test on 2950 trainees from 40 B.Ed. colleges of
Gujarat State. Number of items per component used at various stages of test is given in table 4.4.

<table>
<thead>
<tr>
<th>Table - 4.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of items per component used at various stages of Tests</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Component</th>
<th>Preliminary Tryout</th>
<th>Pre-pilot Tryout</th>
<th>Pilot Tryout</th>
<th>Final Run of the Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mental Ability</td>
<td>54</td>
<td>39</td>
<td>33</td>
<td>25</td>
</tr>
<tr>
<td>2</td>
<td>Adaptability to new situation</td>
<td>27</td>
<td>23</td>
<td>18</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>Behaviour towards children</td>
<td>37</td>
<td>27</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>Interest in profession and educational activities</td>
<td>41</td>
<td>34</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>School subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Gujarati</td>
<td>32</td>
<td>29</td>
<td>22</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>2. Sanskrit</td>
<td>23</td>
<td>23</td>
<td>21</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>3. Hindi</td>
<td>23</td>
<td>24</td>
<td>22</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>4. English</td>
<td>23</td>
<td>27</td>
<td>21</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>5. Social Science</td>
<td>23</td>
<td>24</td>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>6. Science</td>
<td>24</td>
<td>28</td>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>7. Maths</td>
<td>25</td>
<td>26</td>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>8. Economics</td>
<td>23</td>
<td>23</td>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>9. Commerce</td>
<td>23</td>
<td>23</td>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>10. Account</td>
<td>27</td>
<td>27</td>
<td>20</td>
<td>16</td>
</tr>
</tbody>
</table>
The details of above steps for construction of teaching aptitude test is discussed in next chapter.

4.6. METHOD OF DATA COLLECTION:

Data collection for the solution of any research activity is inevitable. The topic selected by the investigator for the research work is unique one. In the case where research topic is unique the problem of selection of exactly appropriate method of data collection and useful tool arises. Same is the case with present research work.

Looking at the data needed for the present research work, investigator decided to construct a new and unique tool namely, Teaching Aptitude Test for B.Ed. trainees so the procedure of data collection of this study is testing and tool is test and data format is raw scores, converted scores.

Researcher started to collect the final data from the B.Ed. colleges in the month of August, 2009. To ensure that the test was administrated on such a large sample in a time bound manner, assistance was taken from lecturers who have the experience about testing and administration of test. Before testing, rapport with B.Ed. trainees was established and instructions necessary for the test were given.

4.7 DATA ANALYSIS:

The term analysis has three separate meanings in research. One meaning is associated with obtaining data, as one might analyse a book, an article, or an individual's behaviour as a part of data gathering. A second meaning analysis refers to product: It is the verbal or written result of the analytical process. The third meaning of the term analysis has to do with making sense of data after they have been collected. This process involves applying statistical treatments to quantitative data or applying logical treatments of qualitative data.

After administration of the final run, scoring was done with the help of window scoring key. The score of the B.Ed. trainees on Teaching Aptitude Test was noted down on top of the answer sheet. All the evaluated answer sheets were classified according to different variables. Gender, Area, Qualification, Faculty and Castewise frequency distribution were prepared.

The frequency distribution tables were prepared for data sample. Mean, median, standard deviation, percentile, quartile deviation, critical ratio of kurtosis and skewness were included in these frequency distribution tables. Smooth frequency curve were plotted for the distributions; also graphs were plotted. Collected data was analysed by t-test and F-test. The 0.05 and 0.01 level of significance were considered satisfactory for the acceptance or rejection of null hypothesis. Reliability and validity was established by correlation coefficient and standard error of correlation coefficient. Percentile rank norms and T-score norms were established for the Teacher Aptitude Test.

4.8 CONCLUSION:

Thus the planning and procedure i.e. selection of components, planning for construction of teaching aptitude test, selection of sample, data collection and statistical analysis etc. is discussed in the present chapter. The major concern of the chapter lies not with the details of how the various difficulties involved in test constructions are to be met, but rather with the need for anticipating these difficulties before they arise, of co-ordinating and trying together the various operations involved, and of ensuring smooth and efficient administration of the project as a whole.

In the next chapter Construction of the Teaching Aptitude Test is presented.
Reference


(9) Peter Sandiford and others. *Forecasting Teaching Ability*. Bulletin No. 8, Department of Educational Research, University of Toronto, 1937, p. 60.


