CHAPTER 4
BASE OF THE RESEARCH AND RESEARCH DESIGN

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4.2 Origin of the Problem
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4.1 INTRODUCTION

Planning is the basic and essential step for an ordinary day to day work to be done systematically. Research also requires planning. Absence of planning will not generate specific outcomes and the research work will end at unsatisfactory results. So, once the research topic has been identified and objectives formulated the next important step is to decide the plan or blueprint for the study.

As an architect prepares a blueprint before he approves a construction, an army prepares a strategy before launching an attack and as any prudent man makes a plan before he undertakes work, similarly, the researcher also makes a plan for the study before undertaking research work. Such a plan is called a research work. Such a plan is called a research design.

So research design is a mapping strategy to save time and resources, like the architect’s plan. It is a plan of action for collecting and analyzing the data in an economic, efficient and relevant manner. It enables the researcher to keep track of his actions and know the direction to achieve the desired goals of the research.

According to Webster’s Dictionary,

“Design is blueprint. The dictionary further describes “Design” to be an invention and disposition of the forms, parts or details of something according to a plan.”

“A research design is the specification of methods and procedures for acquiring the information needed.”

Research design is an important step in the research work because if a wrong decision is made, the whole study may be criticized on account of inappropriate design.

“Thus, Research design must at least contain

- A clear statement of the research problem,
- Procedures and technique to be used for gathering information,
- The population to be studied, methods to be used in the processing and analyzing data”

Hence, in this chapter the researcher prepares the research design for
A STUDY OF THE RELATIONSHIP BETWEEN REASONING ABILITY AND SCHOLASTIC ACHIEVEMENT IN DIFFERENT SCHOOL SUBJECTS OF THE STUDENTS OF STD. 8

4.2 ORIGIN OF THE PROBLEM

“To define a problem means to put a fence around it, to separate it by careful distinctions from the like questions found in related situation of need.”

It is very essential to do a wise selection of a problem, out of many problems. In this research study, the researcher selects the problem i.e. the subject about

A STUDY OF THE RELATIONSHIP BETWEEN REASONING ABILITY AND SCHOLASTIC ACHIEVEMENT IN DIFFERENT SCHOOL SUBJECTS OF THE STUDENTS OF STD. 8

4.3 RESEARCH DESIGN

Research design is a choice of an investigator about the components of his project and development of certain components of the design keeping in view the objectives and the hypothesis of the research. A design of research does not necessarily consist of an ordered sequential step by step procedure. It is a planning stage of research which deals with logic and practicability of the research. A research design includes the selection of the following components.

- Sampling design
- Research method or research strategy
- Research tools and
- Statistical techniques.

Method is the orderliness the review of the literature and related research reports, classification and development of the classes of inquiry and their models are set as an important component of design. A design of research is good if the degree of accuracy is acquired with the relevant evidence. A good research design must be practical. To develop a good research design, sufficient care should be taken to avoid bias in sampling, inadequate number of hypothesis and improperly stating inadequate measurement, missing or
unusable data, and lack of precision in statistical technique and testing hypothesis and regular or habitual practice of them in action. The methodology refers to research that it is a type of inquiry. Research methodology involves the systematic procedures in a valid manner from the identification of the problem to its final conclusions. It involves the procedures and techniques for conducting a study and provides the tools and techniques to resolve the research problem, if properly used.

Research methodology involves identifying problems, review of the literature, formulating hypothesis, and procedure for testing hypothesis, measurement, and data collection, analysis of data, interpreting results and drawing conclusions. Thus, research methodology consists of all general and specific activities of research.

Suitability in designing methodology of educational research requires internal validity and external validity. Internal validity refers to control and external validity as representation of sample. Internal validity is the condition which permits the surety that the observation is produced by the independent information variable. External validity permits the generalization of the findings to the population from which the sample was drawn. To satisfy both of these conditions is difficult. In education the controlled experiment tend to be strong on internal validity and less strong on external validity.

At the risk of over simplification, the investigation may be described as possessing less control concern than does the study and even less of a chain to external validity. The choice of this type of inquiry partially depends on control and representation with a given research project and partially on the relative need for control and representativeness.

Research increases the knowledge along with clarification of the problem and the problem solving. It deals with several variables. Problem solving and understanding derive from control or knowing the effect of a particular variable on other variables. Internal validity deals with the control of variables. The variables consist of dependent, independent and intervening, moderate and extraneous variables.

Internal validity is accomplished to some extent by selection or control of the relevant variables. Thus, it is essential to have a procedure of matching the subjects or proceed for randomization to acquire satisfactory or acceptable
internal validity.

As external validity increases, the certainty of internal validity decreases. External validity deals with representation of sample. Representation is a desirable condition in the experiment and especially demanding condition in the survey research.

Since the findings derived from samples are subject to error, sampling error is used for estimating the accuracy. The degree of external validity is known as level of confidence or level of significance. It is the standard norm for accepting or rejecting the hypothesis. In any test Type-I and Type-II error exist and it needs to be minimized. But practically it is not possible at the same time. Then we fix Type-I error and try to reduce (minimize) Type-II error. This fix value of the Type-I error is called the level of significance or confidence interval. In education normally five percent level of significance is accepted. Whereas more strict level of significance is one percent. 5% level of significance depicted as 0.05 level means that if other samples were drawn from the same population, the likelihood of obtaining a comparable sample finding is 95 in 100 samples. 1% level of significance depicted as 0.01 level means that if other samples were drawn from the same population, the likelihood of obtaining a comparable sample finding is 99 in 100 samples.

The below mentioned process is used by the researcher to establish the result by doing analysis and keeping in mind the subject and the purpose of the research.

- Selection of sampling procedure
- Selection of Tools
- Selection of Tools or construction
- Data Collection
- Data analysis and Statistical Techniques.

4.4 POPULATION

Acc. To Walter R. Borg,

“The first step in developing any sample design is to clearly define the population. A population is any group of individuals who have
one or more characteristics in common that are of interest to the researcher.”

Acc. To Walter R. Borg,

“Population is the aggregate or the totality of the objects or the individuals under the scheme of the study.”

Acc. to K.B. Panday

“Population means the well defined class of people, phenomenon or objects.”

Therefore, population is an important part of each research. It is the group to which the researcher is interested in conducting research. Like, it can be objects, educational institutions, time units, geographical areas, prices of wheat, etc. some statisticians call it universe.

The population of the present study consists of the students of standard 8th of Ahmedabad city.

4.5 SELECTION OF SAMPLING METHOD

To study any problem it is almost difficult to study the whole universe from many points of view. Therefore, there is a need to select a representative sample of the universe. As the success of the research is dependent on the samples selected, hence the selection of the samples should be done carefully. It also increases the scope of accuracy and reliability.

So, in education sampling is a widely used technique. Sampling is fundamental to all statistical methodology of behavioural and social research. It is the part of the strategy of research.

Sampling is the process of selecting the number of individuals for all study in such a way that the individuals represent the large group from which they were selected. The individuals selected comprise a sample and large group is the population.

Acc. to K.S. Siddhu,

“A sample is a small proportion of a population selected for observation and analysis.”

Acc. to David S. Fox

“In the social sciences, it is not possible to collect data from every
respondent to our study but only from some fractional part of the respondents. The process of selecting the fractional part is called sampling. Sampling design means the joint procedure of selection and estimation.”

Thus, through the characteristics of the sample one can make some inferences and generalize about the characteristics of the population from which it is drawn. Sample design is determined before data are collected.

“Selection of the sample saves time, money, energy and other resources. A good sample must provide the whole of the information about the population from which the sample has been drawn and possess the following characteristics.”

- **True representative:** A good sample is the true representative of the population corresponding to its properties.
- **Accurate:** A good sample should provide accuracy without any error.
- **Economical:** A good sample should save time, money, energy and other resource.
- **Free from bias:** A good sample should not permit prejudice, preconceptions and imaginations to influence its choice.
- **Size:** The size of a good sample should be selected keeping in mind time, money, energy, availability of experts, accuracy and scope of the study.
- **Approachable:** A good sample should be such that data is easily collected through administration of research tool on them.
- **Practical:** A good sample has the practicability for research situation.
- **Feasible:** A good sample makes the research work more feasible.
- **Objectivity:** A good sample is an objective one i.e. there is absence of subjective elements from the selection procedure.

The logic of the theory of sampling is the logic of induction that is we proceed from particulars (i.e. sample) to general (i.e. population) and all the results are expressed in terms of probability.

**Methods of Sampling**

Acc to H.E.Garrett,

“Various techniques have been devised for obtaining a sample
Mainly there are two types of sample designs or two methods of sampling:

- Probability Sampling
- Non-Probability Sampling

**Probability Sampling**

Probability sampling normally deals with the selection of the elements from the finite population with equal chance or probability of the selection, for which element of the population as a sample. Therefore, a probability Sample is a one that has been selected in such a way that every element chosen has a known probability of being included.

Probability sampling is generally used in fundamental research in which the purpose is to generalize the results.

**Non Probability Sampling**

When there is no idea of probability than the method is called non probability sampling. It is generally used in action research in which one studies a class without any generalization purpose.

Probability and non-probability sampling are further classified in to the following techniques.

The sampling procedure is very important for a researcher to select the right area. It is not desirable to choose very big population (area), but select it properly even if it is small for sampling purpose, but must cover the whole population of the selected area so that the proper analysis can be done and the good result can be achieved.

Below mentioned four types of sampling should be selected as per the opinion of ‘H. E. GARRET’.

- Random Sampling.
- Statically Random Sampling
- Incidental Sampling
- Purposive Sampling.

The Statically **Random Sampling** process has been selected by the researcher to collect the data to do her Research work. The idea of considering this system is related to the belief that when wide group of
population is distributed in different area, it will be advisable to come to some good conclusion after collecting data from them. And this system allows the researcher to do the research effectively.

The Statically Random Sampling is such a good sampling system which is using Random sampling System and can remove the prejudice created by anyone as well as proper representation of population can be done as per the opinion of ‘H.E. GARRET’.

According to ‘H.E. GARRET’ The Statically / stratified / quota Sampling is to achieve – designed to ensure representation and avoid biases by use of a modified Random Sampling Method.

31 Schools of the city of Ahmadabad is selected without having any prejudice or bias random Sampling System for research work by the researcher.

- Schools of Eastern part of Ahmadabad
- Schools of Western part of Ahmadabad
- Mix Schools

The researcher made a detailed list of the schools of eastern and Western side of Ahmadabad. Then sixteen schools from eastern part and fifteen schools from Western part of Ahmadabad were selected.

The schools which were having more than one class of Standard eight, the double class were selected with the help of using the lottery system. The Random Sampling System is used here overall.

2031 students were selected from these 31 Schools for random Sampling System. Some students were dropped from this Random Sampling system as they did not fulfill the requirement of giving the required data. So at the end 1896 students were selected to give the required data for finding the result.

The details of them are shown below.

The number of students of both the gender of Eastern and Western part of Ahmadabad City.
<table>
<thead>
<tr>
<th>Variable</th>
<th>East</th>
<th>West</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GIA</td>
<td>SF</td>
<td>GIA</td>
</tr>
<tr>
<td>Boys</td>
<td>267</td>
<td>223</td>
<td>251</td>
</tr>
<tr>
<td>Girls</td>
<td>237</td>
<td>204</td>
<td>243</td>
</tr>
<tr>
<td>Total</td>
<td>504</td>
<td>427</td>
<td>494</td>
</tr>
</tbody>
</table>

GIA – Grant in aided, SF – Self finance

4.6 **RESEARCH METHOD**

Research is a purposeful, precise and systematic search for new knowledge, skills attitudes and values for the reinterpretation of existing knowledge, skills, attitudes and values.

“*Method refers to the formal structure of the sequence of acts commonly denoted by instruction.*”

Research methods are of utmost importance in a research process. They describe the various steps of the plan of attack to be adopted in solving a research problem. The “Research Method” which we follow should be directly connected to the problem statement and goal of the research because the research goal and problem may vary with different methods of research. Its role is to carry on the research work in a systematic, scientific and valid manner.

Research Methodology consists of all general and specific activities. Research begins with identification of the problem, review of related literature, formulation and testing of hypothesis, provides tools and techniques for conducting a study, analysis of data, interpreting result and finally drawing conclusions.

**Methods of Research**

**The exploratory research method**
- Historical method
- Ethnography
- Case study

**The Descriptive Research Method**
- Survey Method
- Trend Study
The Experimental Research Method

- Co-relational design
- Criterion group design

The Ex-post-Facto Research Method

- Pre experimental design
- True experimental design
- Quasi experimental design

The selection of the research method depends on the nature and type of the study. Descriptive research is concerned with the present attempts to determine the status of the phenomenon under investigation. It deploys the probability sampling and the parametric tests. Therefore, the researcher has selected descriptive research method which includes survey method which is found to be suitable for the present study.

Survey Method

Survey method is the one of the most common, popular and widely used method in applied social research. Survey is a technique for gathering large amount of information from a larger population in a relatively short duration, with the intent of employing data to justify current practices or to make more intelligent plans for improving them.

“Survey research is the method of collecting information by asking a set of pre-formulated questions in a pre determined sequence in a structured questionnaire to a sample of individuals drawn so as to be representative of a defined population.”

Characteristics of survey method

- It is relatively more scientific and accurate method.
- It provides more accurate data.
- Its data are subjected to parametric treatment.
- Its findings are authentic and accurate.
- Its conclusions are realistic.
- They are relatively inexpensive.

Advantages of survey method

- Large amount of information is obtained from a large population.
- It yields accurate information within sampling error.
• It is relatively less expensive.
• It helps to solve the problems related to education.
• The scope of the survey research is very wide.
• The opinion of the experts can be obtained about the subject.
• Surveys are chiefly used or applied together, the following types of information
  • Data concerning existing status.
  • Comparison of existing status with the established status.
  • Means of improving the existing status while other are limited to one or two by these types.
  
  Survey method deals with existing conditions or relationships, practices, beliefs, ideas, attitudes, influences and trends that are developing. Hence, considering all the aspects of survey method, the researcher found this method appropriate for the present study. Therefore, survey method was selected which was limited to Ahmedabad city.

4.7 CONSTRUCTION OF TEST

Test development is an independent, advanced and technical area of research. Adaptation and improvement of the existing test and construction of new one also amount to research activity.

4.7.1 General procedure of test construction

When researcher decide to construct a test, consider some factors like area, types of schools, gender, age group, grade etc. but in spite of all factors, there are some general principles and procedures which one has to follow while constructing a test.

4.7.1.1 Planning

The construction of test must start by a consideration of the limitation of under which the test has to be developed.
• It includes a detailed set of specification as to the purpose of the test and the time, cost and resources at the disposable of the researcher.
• The nature of the population for which the test is constructed has to be defined
• The length of the test, type and nature of the test items and method of
scoring the test.

4.7.1.2 Preliminary draft

Researcher must consult the existing test while preparation of preliminary draft of test. Researcher must create some original item which covers the attribute and trait adequately. For ability test, it is necessary to compile a large number of item of suitable difficulty. For taking idea about difficulty level trying out this test to a small group and the preliminary draft submitted to the expert for their opinion and criticism. After the necessary modification beneath experts words preliminary draft printed

4.7.1.3 The Try Out

Preliminary draft is administered to large sample of the population for which the test is constructed.

4.7.1.4 Item Analysis

The major objectives of item analysis is the improvement of total reliability or of total score validity or both and the achievement of better item sequence. Item analysis also gives an idea about the difficulty and discriminating value of item.

4.7.1.5 Final Draft

The selected items are put in final draft, which is administered to as a large sample as is practicable for estimating the parameter of validity, reliability.

4.8 PRE-PILOT TEST

For the pre pilot test, non-verbal test comprises 15 items and 20 items for verbal reasoning of each test were decided. The test was given to 8 professors of recognized university, 20 students of M.Ed and B.Ed, and 40 students of different schools of Ahmadabad city. From the analysis of answer sheets it was decide to reject or select some items. research scholar has selected 25 items for non-verbal reasoning test and 42 test items for verbal reasoning of each type of test and the test of 67 question was ready for pilot test.
4.9 PILOT TEST

It was decided to take 67 items.

Four schools of city and rural areas were selected for the pilot.

<table>
<thead>
<tr>
<th>No</th>
<th>Schools Name</th>
<th>Number of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vivekanand Hindi High School Vatwa</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>Lotus High School Isanpur</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>Democratic School Gomtipura</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>Swaminarayan Vivdhakshi School Sukhram</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>Bhagwati Vidyalaya Bapunagar</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>150</strong></td>
</tr>
</tbody>
</table>

Test was given to 150 students answer sheets checked properly. The question wise data was prepared and the item analysis was done.

“A statistical procedure used to determine the quality of individual test items usually includes analysis of difficulty, discrimination and distracters.”

In the selection of items it is necessary to find difficulty value and discrimination value. Difficulty value 1.00 or 0 indicate no individual difference while if the difficulty value tends to be 0.5, it indicates the individual difference 30 it was decided to selected the question which has difficulty value about 0.5.

Discrimination value differentiates the students which are clever or weak. Discrimination value is in between -1.00 to 1.00

<table>
<thead>
<tr>
<th>Value</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 0.40</td>
<td>Item is Very good</td>
</tr>
<tr>
<td>0.30 &lt; Value &lt; 0.39</td>
<td>Item is Comparatively good.</td>
</tr>
<tr>
<td>0.20 &lt; Value &lt; 0.29</td>
<td>Item is Common</td>
</tr>
<tr>
<td>Value &lt; 0.19</td>
<td>Item is Weak</td>
</tr>
</tbody>
</table>

So, it was decided to select the item with discrimination value>=0.30
4.9 ITEM ANALYSIS

Test construction is very important process of taking any measurement. It is very important that to examine how the items of the test are constructed and what changes and modification are required by undertaking preliminary test administration and by making item analysis.

In typical item analysis, study of two aspects of an item is very essential
i) Difficulty Value
ii) Discriminating Value

The computation of difficulty and discriminating value of an item in a test is known as item analysis.

i) Difficulty Value of an item:

Difficulty value of an item in a test is determined on the basis of how many students of a group are able to give correct answer of the item higher the difficulty value of the item more is the number of students giving right answer to that item and the item is said to be easy. Lower the difficulty value of an item less is the number of students giving correct answer to that item and therefore item of the test is said to be difficult. Thus the most easy and most difficult item do not discriminate respondents according to their potential abilities and hence are not useful.

The difficulty value of a given item are as per the formula

Difficulty Value (Dv) = Ru+Rl/2E

Here,
Ru= number of right answers of the given item in upper group
Rl= number of right answers of the given item in lower group
E= Number of Students of each group consisting of the 27% of the whole group of students

ii) Discriminating Value:

Discriminating value of an item in a test is determined by the extent to which it discriminates a bright students from a rest of the group. If an item can be correctly attempted by all students then it fails to discriminates students with respect to a given ability and therefore its discriminating value is zero. An item which cannot be correctly attempted by students also fails to
discriminate students.

Formula for finding discriminating value is as follows-

$$\text{Discriminating Value} = \frac{R_u - R_l}{E}$$

Here,

$R_u =$ number of right answers of the given item in upper group

$R_l =$ number of right answers of the given item in lower group

$E =$ Number of Students of each group consisting of the 27% of the whole group of students

4.9.1 Steps of item analysis

After test administration in preliminary testing and assigning scores, item analysis is undertaking. The main steps involved in this method are described below:

i) Arrange the test papers of the test in decreasing order of magnitude of total scores assigned to them starting from highest to the lowest score.

ii) Divide the arranged test papers into two subgroups namely, the upper subgroup and the lower subgroup. The upper group contains almost 27% of answer the whole group of the students getting highest scores, while the lower subgroup contains almost 27% of the whole group securing lowest scores.

iii) Record the number of the correct answers of each item in the upper group. This number be denoted by $R_u$.

iv) Record the number of correct answers of each item in the lower group. This number be denoted by $R_l$.

v) Put the value in above formula

In present study the item analysis are-

**Analysis of test: Difficulty value, Discriminating value**

**Test - 1**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Difficulty value</th>
<th>Discriminating value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.45</td>
<td>0.48</td>
</tr>
<tr>
<td>2</td>
<td>0.42</td>
<td>0.38</td>
</tr>
<tr>
<td>3</td>
<td>0.51</td>
<td>0.67</td>
</tr>
<tr>
<td>4</td>
<td>0.57</td>
<td>0.52</td>
</tr>
<tr>
<td>5</td>
<td>0.42</td>
<td>0.69</td>
</tr>
<tr>
<td>Item No.</td>
<td>Difficulty value</td>
<td>Discriminating value</td>
</tr>
<tr>
<td>---------</td>
<td>------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>6</td>
<td>0.49</td>
<td>0.38</td>
</tr>
<tr>
<td>7</td>
<td>0.54</td>
<td>0.34</td>
</tr>
<tr>
<td>8</td>
<td>0.41</td>
<td>0.41</td>
</tr>
<tr>
<td>9</td>
<td>0.48</td>
<td>0.47</td>
</tr>
<tr>
<td>10</td>
<td>0.48</td>
<td>0.42</td>
</tr>
<tr>
<td>11</td>
<td>0.56</td>
<td>0.78</td>
</tr>
<tr>
<td>12</td>
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<td>0.65</td>
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<tr>
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</tr>
<tr>
<td>14</td>
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<td>0.39</td>
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**Test - 2**

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<tr>
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<td>0.57</td>
</tr>
<tr>
<td>2</td>
<td>0.54</td>
<td>0.43</td>
</tr>
<tr>
<td>3</td>
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<td>0.78</td>
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<tr>
<td>4</td>
<td>0.53</td>
<td>0.61</td>
</tr>
<tr>
<td>5</td>
<td>0.59</td>
<td>0.57</td>
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<tr>
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<td>0.63</td>
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<tr>
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<td>0.55</td>
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<tr>
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<td>0.48</td>
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86
<table>
<thead>
<tr>
<th>Item No.</th>
<th>Difficulty value</th>
<th>Discriminating value</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>0.60</td>
<td>0.72</td>
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<tr>
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</tr>
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</tr>
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### 4.10 DESCRIPTION OF TOOLS

The research study requires sufficient reliable and valid facts. These facts are obtained through a systematic procedure, which involves various devices known as tools.

Tools are instruments that are employed together new facts or to explore new fields.

A research generally requires many data gathering tools or techniques which may vary in their complexity, design, administration and interpretation. Each tool is appropriate for data collection of certain type of information.

Selection of tool and its use plays a vital role in collection of data and depends upon the research study.

Below mentioned different Tools are used by large for the purpose of collecting data in the research work carried out by the researcher.

- Reasoning Test.
- Scholastic Achievement of the Students.
1. **Reasoning test.** :
   
   The researcher has used self made Reasoning Test
   
   The researcher has used both the above mentioned test to find out the reasoning Power of the students aged 14 to 17 years of Schools.

   This group reasoning test has been divided in two parts.

   - Non Verbal Reasoning Power Test
   - Verbal Reasoning Power Test

   **A. Non Verbal Reasoning Power Test :**

   This test is divided in two parts.
   
   - 10 questions are mentioned in the first part. 4 answers are given at the end. The student has to find out the correct answer and has to right tick mark against the right answer.
   
   - 15 questions are given in the second part. 4 answers are given at the end. The student has to find out the correct answer and has to right tick mark against the right question.

   In both the above exercises first it is explained to students by giving the examples. The student has to understand it thoroughly and has to give answer accordingly.

   **B. Verbal Reasoning Power Test :**

   This second Test is verbal test. There are five different test systems. In every part it is explained in detail with example. The student has to answer after understanding it thoroughly.

   - 14 questions are given in the first part. 5 answers are given at the end. The student has to find out the correct answer and has to right tick mark against the right question.
   
   - 14 questions are given in the third part. 4 answers are given at the end. The student has to find out the correct answer and has to right tick mark against the right question.
   
   - 14 questions are given in the fourth part. 4 answers are given at the end. The student has to find out the correct answer and has to right tick mark against the right question.

   Here the student has to use his intelligence and speed and to answer it quickly by using their Reasoning Power. Here the missing figure has to find
out and to answer accordingly. The answers are not given here. And so by using their mathematical skill they have to answer quickly and rightly.

The main objectives of this type exercise to analyze the logical reasoning power of the students and value the intelligence and correct Reasoning Power of the Student.

2. Scholastic Achievement of the Students:

Scholastic achievement of the student is desirable to know by the researcher to understand the relation between The Reasoning Power and his achievements. For that reason the marks received by the student in second test subject wise (Science and Mathematics) is taken into consideration.

For that the std. eight students of selected Schools are selected and the marks received in only 2 subjects are taken into consideration

- Science
- Mathematics

The details are gathered by using The Random Sampling method and available tools. It is described in following chapters.

4.11 DATA COLLECTION

The researcher has selected nearly 400 schools out of more than 850 Schools of Eastern and Western area of Ahmadabad city. Deleting the English medium School from the list, the researcher divided the remaining schools in two parts.

Then the researcher selected only sixteen Schools from the eastern part and fifteen schools from the Western part of Ahmadabad city for gathering data to do the research work.

After selecting the Schools, the Researcher went to all the schools and met the Principal of every school to explain them the purpose of her research and selecting the specific School. Even thereafter the researcher asked for the permission to carry out her research work by addressing the students and to collect the data.

After getting the permission from the designated Principal, the researcher went to see and meet the students in the presence of the class teacher.
The classroom was selected by lottery wherever there were two class rooms of same std., i.e. std. eight. After choosing the class room, the students were educated regarding the test in the presence of the class teacher. After explaining in detail about the purpose of this test, all students were requested to give answer.

They were explained in detail giving various examples to make them understand and then to fill the test.

By this method total $16+15 = 31$ schools of Eastern and Western area of Ahmadabad city were visited and the test was successfully carried out.

The students who were appeared in the first sample test, they were given the second test chance to fill the test. The detailed description of the sample test is explained in following chapter.

4.11.1 Planning of group test of Reasoning Power and its valuation:

The researcher selected the Std. 8 students of Gujarati medium Schools of Eastern area and Western area of Ahmadabad city.

First of all the researcher met the Principals of selected different Schools to inform them regarding her ideas, vision and research work which she wants to carry out.

In carrying out the work nicely the researcher went to the School. There first of the entire researcher made the arrangement to allow the students to sit in a raw on the benches. The instructions were given to all the students regarding the matter for 10 minutes.

The test paper of non verbal test were given to the students and they were instructed to reply only which were asked.

Once the details were filled by students, then non verbal test of Reasoning Power were given to them and were instructed not to write anything on it. There after the details of sub division test was explained to them by giving different examples.

This group test of Reasoning Power was divided in two departments.


First of all the non verbal test of reasoning Power was given to the students. 25 minutes time period was given to them to finish the test.

Proper instructions were given to students regarding how to answer it.
And then they were instructed to start the test.

When students finished the answers of both the sub division, the answer sheets were taken back from them. And the test paper was also collected back from them.

After giving recess of 10 minutes, verbal test of reasoning Power was given to the students. 25 minutes time period was given to them to finish the test.

Proper instructions were given to students regarding how to answer it. And then they were instructed to start the test.

When students finished the answers of both the sub division, the answer sheets were taken back from them. And the test paper was also collected back from them.

Thereafter to interpret the result of this test, this researcher made the system by which the result of individual can be known. This system was applied to the answers given by all students differently.

The findings of both the test were kept in a master chart and it was noted as different groups of boys and girls of Eastern area and western area of Ahmadabad city.

4.11.2 Note of the Scholastic achievement result Subject wise:

The research has used the system of result gained by students to find out the relation between the Reasoning Power and the scholastic achievement of the students of Std. 8 of selected schools of eastern side and western side of Ahmadabad city.

The researcher did all these on the same day when the test was given and created the result on the same day with prior permission of the principal. These results are taken as scholastic achievements of the students of eastern area and western area of selected schools. The two subjects (science and mathematics) are taken into considerations.
4.12 METHOD OF ANALYSIS

1. To check normality of sample distribution following statistical methods will be performed.
   a. Measurement of central tendency: Mean, Median, Mode
   b. Kurtosis
   c. Skewness

2. To check hypothesis t-test (Critical ratio test) will be performed.

4.13 CONCLUSION

So in present chapter population, sampling techniques, sample of study, research methodology, tools of study, method of data collection and statistical methods of data analysis have been discussed. In further chapter detailed idea of data analysis have been discussed.