Chapter-3

Experimental Design

3.1 Introduction

3.2 Method Of Research

3.3 Population Of The Study

3.4 Sample Selection Of The Study

3.5 Research Method

3.6 The Survey Method.

3.7 Research Tool

3.8 Data Collection

3.9 Data Analysis And Interpretation

3.10 Conclusion
Chapter-3

Experimental Design

3.1 Introduction:

In above chapter “Review of the related literature” the researcher presents importance of review and the past researches, which provides the academic support to the researcher. This chapter “”base of the research and research design” is primarily concerned with the details of the process followed to achieve the objectives of the present study. This chapter also present the design of the study will be used for present investigation. This chapter for the sake of convenience is divided in different sections, which are given below.

1. Research method
2. Population of the study
3. Sample selection of the study
4. Tools
5. Data Collection
6. Analysis and Interpretation
7. Conclusion

❖ Brief description of each step is given below:-

After the review of the literature and previous research, this chapter deals with the data are discussed in this chapter. The methodology used in the study, the tools, the sample and the collection of data are included in present chapter.
3.2 Method of research:

The researcher selected the descriptive research for his study. Descriptive research studies are designed to obtain pertinent and precise information concerning the current status of phenomena and whenever possible, to draw valid general conclusions from the fact discovered. They are restricted not only to the fact finding but may often result in the formulation of important principles of knowledge and solutions of significant problem concerning misconception and understanding of geometrical problems. Descriptive studies are more than just a collection of data; they involve measurement, classification, analysis, comparison and interpretation. They collect and provide three type of information.
Research Planning for school-1std-6

Figure. 3.1

School-1

Std-6th

Experimental group

Control group

60

120

60

Teaching by Task-packages

Teaching by Traditional method

Achievement test

Comparison

Findings

Suggestions
Research Planning for school-1 std-7

Figure 3.2

School-1

Std-7th

Experimental group

120

Teaching by Task-packages

60

Teaching by Traditional method

120

Achievement test

Comparison

Findings

Suggestions

Control group

60
Research Planning for school-2 std-6

**Figure. 3.3**

School-2

Std-6th

Experimental group

Control group

60

120

60

Teaching by Task-packages

Teaching by Traditional method

Achievement test

Comparison

Findings

Suggestions
Research Planning for school-2 std-7

Figure. 3.4

School-2

Std-7th

Experimental group

Control group

60

120

60

Teaching by Task-packages

Teaching by Traditional method

Achievement test

Comparison

Findings

Suggestions
3.3 Population of the study:

It is the finite populations about which conclusions are drawn and which can be counted and listed number of units from which a smaller group of some objective in psychological research in general.

“Population is defined as a complete or the practical set of individuals’ objects or measurements having some common observable characteristics.”

It is not possible to avoid when the whole of the population for different reasons cannot be studied. Even if it is possible it is wasteful of energy time and resources, if it is feasible to get it within tolerable limits of error the same results on the basis of the study of a smaller sample. It is a large group spread over a wide geographical area or small group concentrated in a limited narrow area.

Populations are heterogeneous as well as homogeneous with regard to characteristics. Hence each heterogeneous population can have homogeneous sub-population. The tiniest part of population is called the units. Hence population means the total sum of these units. Thus, this is basic necessity of inferential research that the sample should be representative of the population. In this study, all the primary school students of standard 6th and 7th will be the population of the study.

3.4 Sample selection of the study:

Types of sampling can be broadly classified into two types as follows.

- **Criteria of Using Probability Sampling:**
  
  It employs probability theory for selecting the sample. The size of the sample is usually large. The sample size is fixed. Sample is selected before the process of research begins.
The sample size is decided statistically and hence researcher’s bias is controlled. Planning the sampling design is time consuming, has fixed parameters, may be laborious, may be complex and may involve higher cost. It treats, Respondents as units. Sample is representative of the population. It facilitates inductive generalization and is employed in quantitative research.

**Criteria of Using Non-Probability Sampling:**

It does not employ probability theory for selecting the sample. The size of the sample is usually small and includes a few typical cases. The sample size is not decided statistically. The sample size is flexible but can also be fixed. Sample is selected before and during the process of research. Researcher’s bias may not be controlled. Planning the sampling design is not time consuming, has flexible parameters, involves simple procedures, is relatively easy and involves lower cost. It treats respondents as people. Representativeness of the sample is limited. In this method, investigator bias in the selection of cases is not controlled and generalizing the research findings to the population must be done carefully. However, it facilitates analytical generalizations and is mostly employed in qualitative research.

**Probability(random) sampling:**

The choice of respondents is guided by the probability principles, according to which every unit of the target population has a predetermined, calculable and non-zero probability chance of being selected in the sample independent of other units in the population in a procedure. The various types of probability sampling methods are as follows:
Probability of sampling

Figure 3.5

- **Sample Random Sampling:**

  The characteristic of this type of sampling is that the sampling units have an equal as well as independent chance of being selected in the sample i.e. their chance of being selected in the sample does not depend on the selection of other units. The main advantage of this technique of sampling is theoretically most accurate and the selection of sample is influenced only by chance. Its chief disadvantage is that sometimes a list of the entire population is unavailable or practical considerations prevent the researcher from using random sampling technique. The four common methods of selecting a sample random sample are as follows:

- **Lottery Method:** The process of selecting respondents using this method includes the following steps:

  Identify or construct a sampling frame which includes a list of all the units of the target population. This sampling frame could include a list of districts, Talukas, schools, colleges’ teachers, students etc. Determine the sample size. Give each unit a number. Place each number written on a small piece of paper in a box.
Mix them thoroughly and remove one piece of paper from the box. The number written on this piece of paper and the corresponding unit in the sampling frame is selected in the sample size is obtained.

This process has two variations. In the first one, after selecting one piece of paper and the corresponding unit in the sampling frame, the piece of paper is replaced in the box. If the same number is selected again, it is ignored. This is known as probability sampling with replacement. In the second variation, the selected piece of paper is not put back in the box. This is known as probability sampling without replacement. Both methods are equally acceptable.

- **The Random Numbers Tables Method:**

  There are published random number tables available, which could be used for selecting the sample. Such random number tables are also available in books on Statistics. The process of selecting respondents using this random number table includes the following steps: Identify or construct a sampling frame. Determine the sample size, give each unit of the population a number from 1 to N or to n-1. Select appropriate table of random numbers. Pick numbers from the table randomly and the corresponding unit in the sampling frame is selected in the sample. Suppose the size of the population is 80 and we need to select a random sample of 8 units.

- **The Computer Method:**

  The facility of selecting a simple random sample is available on the computer. Random number generation is easy these days with a computer where, for example, the MS-Excel=RAND( ) function (just type it into any cell) To generate a random number between 0 and 1. To generate a number between 0 and 70, multiply this by seven and take the integer to round it down [INT(5*rand( ))] . The computer is used for selecting a
sample of students, prizewinner, and applicant for a lottery and for various other purpose.

- **Tossing of a Coin:**
  This basic sampling design is based on probability theory. In this form of random sampling, every element of the population being sample has an equal probability of being selected. Toss is an important part of this sampling process. When everything becomes equal, toss is the ultimate decider. Normally a fair coin is used for tossing. A coin has two sides head (H) and tail (T). The result of such a tossing is used then there are possible 8 outcomes. This can be shown as follows:

  \[
  \text{HHH HHT HTH HTT THH THT TTH TTT}
  \]

  As the coin is fair, the probability of each outcome can be considered as equal.

- **Stratified Random Sampling:**
  “Stratified sampling technique is generally used when the population is heterogeneous or dissimilar or when certain homogeneous or similar sub-populations can be classified into strata. i.e. when the population comprises of several distinct categories, the sampling frame can be classified into separate “strata”. Each stratum is then sampled as an independent sub-population, out of which individual elements can be randomly selected” 2. There are several potential benefits to stratified sampling. The stratified sampling approach is most effective when. Variability within strata is minimized, Variability between strata is maximized and the variables on which the population is stratified have a strong correlation with the dependent variable. This technique enables the researcher to draw inferences about specific subgroups that may be lost in a more generalized random sample as the population is divided into
distinct, independent strata. It also leads to more efficient statistical estimates if strata are selected based upon relevance to the criterion in question, rather than availability of the samples. When the data are more readily available for individual, pre-existing strata within a population than for the overall population, stratified random sampling technique is more useful. At the same time, one must also be aware of the limitations of stratified random sampling which include higher cost and population estimates. Also, if the research design requires a large number of strata each with a specific number of minimum sample sizes per stratum, the necessary sample size would be as large as that necessary in sample random sampling. This sampling technique ensures large enough sample, which can be subdivided on important variables for detailed analysis. This sampling technique is essential when population is too large to list. In addition, this technique can be combined with other techniques

- **Systematic Random Sampling:**
  Systematic sampling relies on arranging the target population according to some ordering scheme and then selecting elements at regular intervals through that ordered list.

Systematic sampling involves a random start and then proceeds with the selection of every K\textsuperscript{th} element from then onwards. In this case, k=(population size/sample size). It is important that the starting point is not automatically the first in the list, but is instead randomly chosen from within the first to the k\textsuperscript{th} element in the list. A simple example would be to select every 10\textsuperscript{th} name from the list of schools (an ‘every 10\textsuperscript{th} sample, also referred to as ‘sampling with a skip of 10’). When the first unit is selected randomly in this technique, systematic sampling is a type of probability sampling. This technique of sampling is similar to random sampling and is often easier than random sampling
• **Cluster Sampling:**
Cluster sampling is typically used when the researcher cannot get a completed list the members of a population they wish to study but can get a complete list of groups or ‘clusters’ of the population. It is also used when a random sample would produce a list of subjects so widely scattered that surveying them would prove to be far too expensive, for example, people who live in different districts of a State or different States of India. This sampling technique may be more practical and/or economical than simple random sampling or stratified sampling. Cluster sampling is a sampling technique where the entire population is divided into groups or clusters and a random sample of these clusters are selected. All observations/units in the selected cluster are included in the sample.

**Limitations of Probabilistic Sampling**
These are as follows:
Probability samples are at times more expensive.
Non-response could be a special problem.

If one cannot list the elements in the population, use of probability sampling techniques is impossible. Probability samples are at time quite time-consuming.

❖ **Non probability sampling:**
The difference between non-probability sampling is that non-probability sampling does not involve random selection whereas probability sampling does. Non-probability samples cannot depend upon the rationale of probability theory. With a probabilistic sample, the researcher knows the probability of representativeness of the sample and is able to estimate confidence intervals for the sample statistic. With non-probability samples, the researcher may or may not be able to represent
the population well. In general, researchers prefer probabilistic or random sampling methods to non-probabilistic ones and consider them more accurate and rigorous. However, in educational research, there may be circumstances where it is not feasible, practical or theoretically sensible to do random sampling. Here, a wide range of non-probabilistic alternatives for sampling could be considered. These are as follows:

- **Incidental Sampling:**
  As the name implies, the incidental sample consists of units, which are obtained because cases are readily available. This is also known as accidental, convenient or the available sampling technique. In selecting the incidental sample, the researcher determines the required sample size and then simply collects data in that number of individuals. Selecting volunteer sample is an example of incidental sampling technique. The major drawback of incidental sampling is that those elements selected may not truly represent a larger population.

- **Purposive Sampling:**
  Purposive samples are also referred to as judgment samples and are employed by the researcher in order to approximate the cluster sample using a non-probability sample. In this sampling method, the researcher selects a “typical group” of individuals who might represent the larger population and then collects data from this group.

- **Quota Sampling:**
  Quota sampling is a method of sampling widely used in opinion polling and survey research. The quota sample is an attempt to approximate the stratified random sampling technique but in a non-random manner. The researcher first identifies those categories, which he or she feels are important to ensure the representativeness of the population, than
establishes a sample size for each category, and finally selects individuals on an availability basis.

- **Snowball Sampling:**
  In snowball sampling, the researcher identifies and selects available respondents who meet the criteria for inclusion in his/her study. After the data have been collected from the subject, the researcher asks for a referral of other individuals, who would also meet the criteria and represent the population of concern. Although this method cannot lead to a representative sample, there are times when it may be the best method available. Snowball sampling is especially useful when the researcher is trying to reach populations that are inaccessible or difficult to find. For instance, if the researcher is studying the homeless children, he/she is not likely to be able to find a readymade list of homeless children within a specific geographical area. In such a case, the researcher could go to some area that has homeless children and identify one or two such children, and may find that they know very well who the other homeless children in their vicinity are how the researcher could ultimately obtain a sample of the required size. However, such a sample could be a biased and non-representative sample.

- **Multistage sampling:**
  One may view the population as being composed of primary sampling unit of ‘Wards’ of a city, Thus, at the first stage of sampling, wards are selected using, say, simple random sampling. Form each of these wards, at the second stage, private-aided, private-unaided and Government (Municipal) schools are selected using, say, stratified random sampling. At the third stage of sampling teachers (or students) could be selected from these schools. This is an example of a three-stage sampling procedure. In a multistage sampling procedure, the technique of sampling
(Sample Random Sampling, Stratified Random Sampling, Systematic Random Sampling, Cluster Sampling, Incidental Sampling, etc.) can differ at each stage. Ideally, at each stage, probability sampling technique should be used.

**Multiphase sampling:**

Sampling is fundamental to all statistical methodology of behavioural and social research. Bad sampling vitiates the data at the source. No amount of subsequent statistical findings will improve its quality. Sampling is the part of the strategy of research. It has acquired the status of technical job.

**According to David S Fox**

“It is not possible to collect data from every respondent relevant to our study but only from some fractional part of the respondents. The process of selecting the fractional part is called sampling.”

In the present study, ‘Incidental sampling’ technique was used by the investigator. Incidental sampling is used in a large scale survey for a more comprehensive investigation. In this study,

Data were collected from Gujarati medium primary school students of Kheda district of Gujarat state. The details of sampling techniques followed in the present study is given in table: 3.1
Table 3.1
School List

<table>
<thead>
<tr>
<th>Schools Type</th>
<th>Standard</th>
<th>Boys</th>
<th>Girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>6</td>
<td>60</td>
<td>60</td>
<td>120</td>
</tr>
<tr>
<td>B</td>
<td>7</td>
<td>60</td>
<td>60</td>
<td>120</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>120</td>
<td>120</td>
<td>240</td>
</tr>
</tbody>
</table>

- Students of experimental group and controlled group of std-6\textsuperscript{th} were equally divided in both groups on the basis of their merit of std-5\textsuperscript{th}
- Students of experimental group and controlled group of std-7\textsuperscript{th} were equally divided in both groups on the basis of their merit of std-6\textsuperscript{th}

3.5 Research Method:

The research method may be presented to advantages in tabular form with the source of data, type of control approach, typical purpose for each research method and typical form of stating results as the sub headings in classification. There are so many methods as, the historical method, The survey method, The case method, The statistical method, The experimental method, combination of the above. In this study, the researcher has used
3.6 The Survey method:

The term survey is used for the technique of investigation by a direct observation of a phenomena or systematic gathering of data from population by applying personal contact and interviews when adequate information about a certain problem is not available in records, files and other sources. According to Webster collegiate Dictionary,

“Survey is a critical inspection, often official, to provide, exact information, often a study of a area with respect to a certain condition or its prevalence, e.g., a survey of the school”.

- Characteristics of the Survey Method:
  1. It gathers Data from a relatively large number of cases at a particular time.
  2. It is essential cross-sectional.
  3. It is not concerned with the characteristics of individuals.
  4. It involves clearly defined problem.
  5. It requires expert imaginative planning.
  6. It involves definite objectives.
  7. It requires careful analysis and interpretation of the data gathered.
  8. It requires logical and skillful reporting of the findings.
 10. It does not seek to develop an organized body of scientific principles.
 11. It provides information useful to the solution of local problems.
 12. It contributes to the advancement of knowledge by affording penetrating insight in to the nature of what one is dealing with.
 13. It suggests the course of future developments.
It helps in fashion many tools with which we do the research. Thus, the survey method is very helpful method for research.

**Tool of The Study:**

There are four techniques of data collection as follows:

**Figure 3.6**

![Tools of Data Collection Diagram](image)

Each type of tool is described in detail in the following section.

**Questionnaire:**

A questionnaire is a research instrument consisting of questions and other prompts asked to individuals to obtain statistically useful information about a given topic. The questionnaire was invented by Sir Francis Galton. When properly constructed and responsibly administered, questionnaires become a very important tool by which statements can be
made about specific groups or people or entire populations. The questionnaire is a standardized data-gathering procedure.

Types of Questions

These are as follows:

- **Demographic Questions:**
  These are also known as classified or background question such as age, gender, standard, level of assignment, urban – rural background, caste, religion and so on. This information is used when you are categorizing your results by various subdivisions such as age or standard. Therefore, these questions should be consistent with your data analysis plan.

- **Contingency Questions:**
  A question that is answered only if the respondent gives a particular response to a previous question. This avoids asking questions to people that do not apply to them. For example, if your question is whether a candidate has appeared in the examination and his reply is negative, there is no point in asking the class or percentage by him.

- **Matrix Questions:**
  Identical response categories are assigned to multiple questions. The questions are placed one below the other, forming a matrix with response categories along the top and a list of questions on the side.

- **Closed-ended Questions:**
  In this type of questions, respondents’ answers are limited to a fixed set of responses. Most questionnaires are closed ended. Closed ended questionnaires include Questions that could be answered in a Yes/No, Multiple Choice questions wherein the respondent has several option from which to choose Scaled questions in which responses are graded on a continuum. This type of questions are used to determine feelings or
opinions on certain issues by allowing the respondent to choose as answer from a list you have provided. The intensity question, a special form of the multiple-choice question is used to measure the intensity of the respondent’s feelings on a subject. These questions provide answers that cover a range of feelings.

- **Open-ended Questions**:
  In this type of questions, no options or predefined categories are suggested. The respondent supplies their own answer without being constrained by a fixed set of possible responses.

This personality inventory is developed by Mrs. B.G. Eysenck, named - Junior Eysenck personality Inventory This test can be used on 8th standard student to any adult person. By this Questionnaire researcher can get scores of Extraversion, Neuroticism and Lie personality. In this Questionnaire, there are ‘YES’ and ‘NO’ type options, by making circle on it any person give his answer. In this Questionnaire total statements are 60, Extraversion (E) Statements are 24, and Neuroticism (N) statements are also 24, where Lie (L) statements are 12. If L score is 10 or more, then this score is not reliable.

**3.7 Research tool:**

The collection of data through questionnaire is one of the most popular methods used these days. A questionnaire contains many questions pertaining to the field of inquiry and provides space for answers. It may be defined as an instrument for collecting information from a number of persons, supposed to possess it by making them record their replies to a number of questions.
According to W J Goode and K. Hatt,

“In general, the word questionnaire refers to a device for securing answers to questions by using a form which the respondent fills in himself.’

The main base for the solution of the research problem depends upon the selected tool. so that the solution of the selected problem may be adopted through reliable manners, more over the exact result might be obtained, for that proper tool selection is more beneficial and profitable because the result depends upon the selected tool, mostly in educational tool below mentioned tools are very popular-

1. Interview
2. Check list
3. Rating scale
4. Questionnaire
5. Inventory self made test. In this study researcher has used self made tools.

**Planning for executing task packages :**

In this present study researcher has decided to prepare task packages for students of both std-6 and std-7. Teaching work done by task package can be understood easily by students. In this present study researcher has made very easy and interesting task packages like chart, pictures, models, exercise, analysis chart etc.
Objectives of task packages:-

- Students can translate the sentences.
- Students can generalize the rules.
- Students can solve puzzles.
- Students can understand hidden message in the chart.

Primary task package of each lesson was designed and then task packages were divided into four sections. Which are as follows.

- Sentence formation activities.
- Analytical activities.
- Classroom interaction activities.
- Evaluation activities.
- Lesson content activities.
- Chart, puzzle activities.

Task package of each lesson was prepared according to these above mentioned six activities.

Table 3.2

Expert’s opinion about task package

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>Name of expert</th>
<th>Designation</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dr.K.R.Dave</td>
<td>Rtd.Professor PG Sanskrit department, S.P.Uni.Vallabh vidhyanagar</td>
<td>Use more charts.</td>
</tr>
<tr>
<td>2</td>
<td>Dr.M.K.Yagnik</td>
<td>Professor, PG Education Department S.P.Uni.Vallabh vidhyanagar</td>
<td>Try to use working models.</td>
</tr>
<tr>
<td></td>
<td>Name</td>
<td>Designation</td>
<td>Suggestion</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------------------</td>
<td>--------------------------------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>3</td>
<td>Dr. Niranjanbhai P. Patel</td>
<td>Professor and Head, PG Department Pali-Sanskrit, S.P.Uni. Vallabhbh vidhyanagar</td>
<td>Try to use more charts.</td>
</tr>
<tr>
<td>4</td>
<td>Dr. Vipul M. Shrimali</td>
<td>Principal, J.M. Patel Arts College S.P.Uni. Vallabhbh vidhyanagar</td>
<td>Try to use pictures for better understanding.</td>
</tr>
<tr>
<td>5</td>
<td>Dr. Jayshreeben K. Patel</td>
<td>Lecturer, M.B. Patel College Of Education, S.P.Uni. Vallabhbh vidhyanagar</td>
<td>Use more pictures to make your work sharp.</td>
</tr>
<tr>
<td>8</td>
<td>Dr. Sachin K. Darji</td>
<td>Lecturer, PG Department Sanskrit, Sri J.M. Patel PG Studies &amp; Research in humanities S.P.Uni. Vallabhbh vidhyanagar</td>
<td>Try to involve students in activities.</td>
</tr>
</tbody>
</table>
| 10 | Maheshbhai C.Chavda  
I/C Principal,P.K.Inamdar college of education, S.P.Uni.Vallabh vidhyanagar | Add more activities. |
| 11 | Kirit R.Chauhan  
Assit.Professor Sardar PatelCollege of Education,Bakrol S.P.Uni.Vallabh vidhyanagar | Students active participation is required. |
| 12 | Hitesh A.Makwana  
Lecturer,Shri P.M.Patel College Of Education,S.P.Uni.Vallabh vidhyanagar | Add more activities. |
| 13 | Tejalben N.Padhiyar  
| 14 | Smt.Kalpanaben  
Teacher,Bavisgam Vidhyalaya VVNagar | Add more activities. |
| 15 | Smt.Nilamben Parmar  
Teacher,Bavisgam Vidhyalaya VVNagar | Students’ active participation is required. |

**Construction of research tool:**

Researcher has decided to collect data for that researcher decides to prepare appropriate tool for their researcher work in this present study researcher has made achievement test for students. In this present study researcher has made two types of tool for their research. Researcher had
followed valuable instructions made by the experts for the improvement of test.

1-Achievement test- 2-Gujarati subject test- 3-Oppenionnaire for teacher-

**Objectives of the test:**

in this present study researcher has made two tests for students and both the tests observed the same objectives mentioned below.

1-According to types of questions.

2- According to the weight age of the unit.

3-According to the number of questions from selected units. Test was made according to the blue print and its three dimensions.

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>Objectives</th>
<th>No. of questions</th>
<th>Weightage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Knowledge</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>2</td>
<td>Understanding</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>3</td>
<td>Application</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>4</td>
<td>Analyzation</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>20</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
Table-3.4
Weightage According to Content.

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>Content</th>
<th>No. of questions</th>
<th>Weightage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unit-1</td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>2</td>
<td>Unit-2</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>3</td>
<td>Unit-3</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>4</td>
<td>Unit-4</td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>5</td>
<td>Unit-5</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>6</td>
<td>Unit-6</td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>7</td>
<td>Unit-7</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>8</td>
<td>Unit-8</td>
<td>3</td>
<td>15%</td>
</tr>
</tbody>
</table>

20 100%
Table-3.5

Three dimensional charts for the construction of tests

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Units</th>
<th>knowledge</th>
<th>Comprehension</th>
<th>Application</th>
<th>Skill</th>
<th>Total questions</th>
<th>Total weightage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unit-1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>2</td>
<td>Unit-2</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
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In Present study researcher has given achievement test for the students based on Sanskrit task packages to the students of std-6 and std-7 and after the completion of allotted time researcher has collect it back for the analysis and interpretation (appendix- g to fff)
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**3.8 Data Collection:**

Educational researches require the data means of some standardized research tools or self designed instrument. Data mean observation or evidences. All taking due permission from the head master/ head mistress of the sampled school. These task packages were supplied individually to each student Necessary information were given for responding. Attention was also given not to disturb the day to day school routine work. During the leisure hours the students were instructed to fill up the tool. The investigator was also present in the school in order to help the students, whenever they feel any difficulty. So far as the data regarding tool is concerned the investigator collected all the tool from the school. After the collection of data from the different students, the filled in tool were scored according to their respective scoring keys. The scores provided the data for the present study to test different hypothesis proposed.
3.9 Data analysis and interpretation:

Before describing the techniques of data analysis, it is necessary to clarify the meaning of the term data. Data is an aspect of knowledge. Steps Involved In Data Analysis In most educational research, data analysis involves four major steps, done in roughly the following order:

1. **Determining Unit Of Analysis:** Units of analysis are the person, things or events under study. It refers to the entities under study. Appropriate unit of analysis depend on objectives of the study.

2. **Data Representation:** It involves organizing the data for analysis, checking the data for accuracy, entering the data into the computer, transforming the data and developing and documenting a database structure that integrates the various measures.

3. **Descriptive Data Analysis:** Descriptive statistics are used to describe the basic features of the data in a study. They provides simple summaries about the sample and the measures. Together with simple graphics analysis, they form the basis of virtually every quantitative analysis of data they simplify describe what is, what the data shows.

4. **Inferential Data Analysis:** It is aimed at testing of hypothesis. The conclusion from inferential statistical extends beyond the immediate data. For instance, we use inferential statistics to estimate population parameters from the sample statistics.

(A) **Inferential Data Analysis:**

Inferential techniques of data analysis are of two types.

- Parametric techniques
- Non-parametric techniques
(B) Conditions Necessary For Using Parametric Techniques:

Parametric techniques are applied for testing a hypothesis when the following conditions are satisfied:

- The sample is selected randomly.
- When the variance of the various groups are equal or nearly equal.
- When the data are in the interval or the ratio scale.
- When the observations are independent.
- When the sample size is large i.e. N>30
- When the data follows normal distribution.

(c) *t*-test: A *t*-test is used to compare the mean Scores obtained by two groups on a single variable. It is also used when F-ratio in ANOVA is found to be significant and the researcher wants to compare the Mean scores of different groups included in the ANOVA. It can also be used to compare the Mean Academic Achievement of two groups such as

(1) boys and girls or (2) Experimental and control group etc. The *T*-test was introduced in 1908 by William Sealy Gosset, a chemist working in Ireland, his pen name was “Student”.

The assumptions on which the *t*-test is used are as follows:

Data are normally distributed. This can be ascertained by using normality tests such as the Shapiro-Wilk and Kolmogorov-Smirnov tests.

Equality of variances, which can be tested by using the F-test or the more robust Leven’s test, Bartlett’s test or the Brown-Forsythe test. Samples may be independent or dependent, depending on the hypothesis and the type of samples. For the inexperienced researcher, the most difficult issue is often whether the samples are independent or dependent. Independent samples are usually two randomly selected groups unrelated to teach
other such as boys and girls or private-aided and private-unaided schools in a causal-comparative research. On the other hand, dependent samples are either two groups matched (or a “paired” sample) on some variable or are the same people being tested twice (called repeated measures as is done in an experimental design). Dependent t-test can also be used for matched-paired samples, where two groups are matched on a particular variable.

Figure 3.7

Types of t-test

Independent one-sample t-test

Experimental group

Independent two-sample t-test

Experimental group

• Alternatives to t-test

The t-test can be used to test the equality of the means of two normal populations with unknown, but equal, variance. To relax the normality assumption, a non-parametric alternative to the t-test can be used and the usual choices are For independent samples, the Mann-Whitney U test and
For related samples, either the binomial test or the Wilcoxin signed-rank test. To test the equality of the means of more than two normal populations, an analysis of variance can be performed.

- **Statistical techniques used:**

In present study following statistical techniques were used to analyze the data and to accomplish objectives of the study.

Mean and standard deviation is computed to know the nature of distribution. In order to calculating significant difference ‘t’ test is used to compute the data gathered.

**3.10 Conclusion:**

In this chapter the researcher depicted the base for research work, and research design which is necessary to achieve the objectives of the present study. In this chapter researcher presents population and sample and tools used for data collection, survey method and statistical method is t-test were used to compute the data gathered.
End Notes


