



Indira Gandhi National Open University
Staff Training and Research Institute of
Distance Education

MDE-415
Research For
Distance Education

Block

3

TOOLS FOR RESEARCH

Unit 1 Methods of Sampling	7
Unit 2 Research Tools-1	27
Unit 3 Interview, Observation and Documents as Tools	52
Unit 4 Data Collection	67

MDE-415: Research For Distance Education

(New Course in place of ES-315: Research For Distance Education)

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MDE-415 RESEARCH FOR DISTANCE EDUCATION

Block 1 Introduction to Research in Distance Education

- Unit 1 Introduction to Educational Research: Purpose, Nature and Scope
- Unit 2 Research Paradigms in Distance Education
- Unit 3 Research in Distance Education
- Unit 4 Formulation of Research Problems

Block 2 Research Methods for Distance Education

- Unit 1 Methods of Educational Research
- Unit 2 Philosophical and Historical Method
- Unit 3 Naturalistic Inquiry and Case Study
- Unit 4 Descriptive, Experimental and Action Research

Block 3 Tools for Research

- Unit 1 Methods of Sampling
- Unit 2 Research Tools-I
- Unit 3 Interview, Observation and Documents as Tools
- Unit 4 Data Collection

Block 4 Data Analysis

- Unit 1 Types of Data
- Unit 2 Statistical Testing of Hypotheses
- Unit 3 Reporting Research
- Unit 4 Evaluating Research Reports

Block 5 Computer Applications in Research in Distance Education

- Unit 1 Computer for Data Processing
- Unit 2 Basics of MS Word 97
- Unit 3 Basics of MS Excel 97
- Unit 4 Data Management, Analysis and Presentation

BLOCK 3 TOOLS FOR RESEARCH

Block Introduction

In Blocks One and Two we led you through an Introduction to Research in Distance Education to Research Methods for Distance Education. Block Three deals with various ways of collecting data and tools employed while doing so. This Block has 4 Units.

Unit 1 deals with the concept of population, sample and various sampling methods used in research. The characteristics of a good sample are also discussed in this unit.

In Unit 2 we describe the characteristics of a good research tool and examine four important types of tools used for collecting data. These are the Questionnaires, Rating Scales, Attitude Scale and Tests.

In Unit 3 we continue with the same theme and discuss more tools like Interviews, Observation and Documents. The types, uses and limitations of each tool have been explained in both these units. The last Unit 4 deals with the various methods and processes of data collecting, e.g. asking question, and of analyzing existing records. How to ensure the quality of data has also been dealt with in this unit.

We hope you will enjoy reading this module.

LET US BEGIN HERE

The Course on the theme **Research for Distance Education** is divided into five Blocks. This is the third Block. It comprises four Units in all. A schematic representation of the design of Units is given below.

Unit X

X.0	Introduction	
X.1	Objectives	
X.2	Section 1 (Main Theme)	
	x.2.1 Sub-section 1 of Section 1	Check Your Progress
	x.2.2 Sub-section 2 of Section 1	
X.3	Section 2 (Main Theme)	
	x.3.1 Sub-section 1 of Section 2	Check Your Progress
	x.3.2 Sub-section 2 of Section 2	
	-----	Check Your Progress: The Key

X.n	Let Us Sum Up	

As the scheme suggests, we have divided the units into sections for easy reading and better comprehension. Each section is indicated distinctly by bold capitals I and each sub-section by relatively smaller but bold² upper and lower typeface. The significant divisions within sub-sections are in still smaller but bold** upper and lower typeface so as to make it easier for you to see their place within sub-sections. For purposes of uniformity, we have employed the same scheme of “partitioning” in every unit throughout the course.

We begin each unit with the section ‘Introduction’ followed by ‘Objectives’ which articulate briefly

- What we have presented in the unit, and'
- What we expect from you once you have finished working on the unit.

In the last section of each unit, under the heading, 'Let Us Sum Up', we summarise the whole unit for the purpose of recapitulation and ready reference.

Besides, we have given self-check exercises under the caption ‘Check Your Progress’ at a few places in each unit, and at the end of the unit “Possible answers” to the questions set in these exercises.

What, perhaps, you ought to do is to go through the units and jot down important points as you read in *the space provided in the margin*. **(Broad margins in the booklet are there for you to write your notes on).** Make your notes as you work through the materials. This will help you prepare for the examination and also help in assimilating the content. Besides, you will be able to save on time. Do use these margins. This will help you to keep track of and assimilate what you have been reading in the unit.

We hope that we have given enough space for you to work on the Check Your Progress exercises. The purpose of giving self-check exercises will be served satisfactorily if you compare your answers with the possible ones given at the end of each unit after having written your answer in the blank space. **You may be tempted to have a furtive glance at the possible answer(s)**, as soon as you come across an exercise. But we do hope that you will overcome the temptation and turn to the possible answers (which are not necessarily the best answers) only after you have written yours.

These exercises are not meant to be submitted to us for correction or evaluation. Instead, the exercises are to function as a study tool to help you keep on the right track as you read the units.

We suggest the following norms to be strictly practised while you are working through the assignments.

- Write your roll number legibly.
- Before you put anything down in words, assimilate what you have read, integrate it with what you have gathered from your experience to build your answer, and preferably prepare a concept map before starting to write it.
- Make the best use of the Block and additional reading materials by diligently working through the assignments.

Mail us

At the end of this block, we have provided a feedback questionnaire. Please fill it after you complete this block and send it to us. Your feedback shall be highly useful for future revision and maintenance of the course. Also please take note of the time you devote to studying this block. May be, you complete this block after 4-5 sittings. But for every sitting kindly note the time separately so that you can categorically say how much time you took to read this Block. You can send the feedback form by post or you can email the same to: *mparhar@ignou.ac.in*. In the email, please mark in the subject area - FOR COURSE COORDINATOR-MDE-415. You may also - contact us for any difficulties related to the programme in general and MDE-415 in particular.

UNIT 1 METHODS OF SAMPLING

Structure

- 1.0 Introduction
- 1.1 Objectives
- 1.2 Concept of Population and Sample
- 1.3 Methods of Sampling
 - 1.3.1 Probability Sampling
 - 1.3.2 Non-probability Sampling
 - 1.3.3 Choice of the Sampling Method
 - 1.3.4 Characteristics of a Good Sample
 - 1.3.5 Determination of Sample Size
- 1.4 Key Points at a Glance
- 1.5 Let Us Sum up
- 1.6 Glossary
- 1.7 Check Your Progress: The Key

1.0 INTRODUCTION

In order to carry out a research study, you have to first acquire relevant information on the subject. In other words, you have to collect data. This data is required to test your 'hypotheses' or generalizations that you have made for the time being. Let us suppose that as a researcher, you want to look into the relationships between study habits and achievement motivation of undergraduate Students of IGNOU. For this, you have to select a few representative cases or samples from the entire population of undergraduate students of IGNOU. The process of selection demands thorough understanding of the concept of population, sample and various sampling techniques. In this Unit, we shall familiarize you with the concepts of sample and population. We shall also discuss the characteristics of a good sample and the various methods of sampling.

1.1 OBJECTIVES

On the completion of this Unit, you should be able to:

- Define the terms, population and sample,
- Describe the steps in the sampling process and the various methods of sampling,
- Define a probability sample and describe the various types of probability sample,

- Define a non-probability sample and describe the various types of non-probability sample,
- Describe the characteristics of a good sample, and
- Use computer softwares for the purpose of selection of sample.

1.2 CONCEPT OF POPULATION AND SAMPLE

A “sample” is a miniature representation of and selected from a larger group or aggregate. In other words, the sample provides a specimen picture of a larger whole. This larger whole is termed as the “population” or “universe”. In research, this term is used in a broader sense; it is a well defined group that may consist of individuals, objects, characteristics of human beings, or even the behaviour of inanimate objects, such as, the throw of a dice or the tossing of a coin.

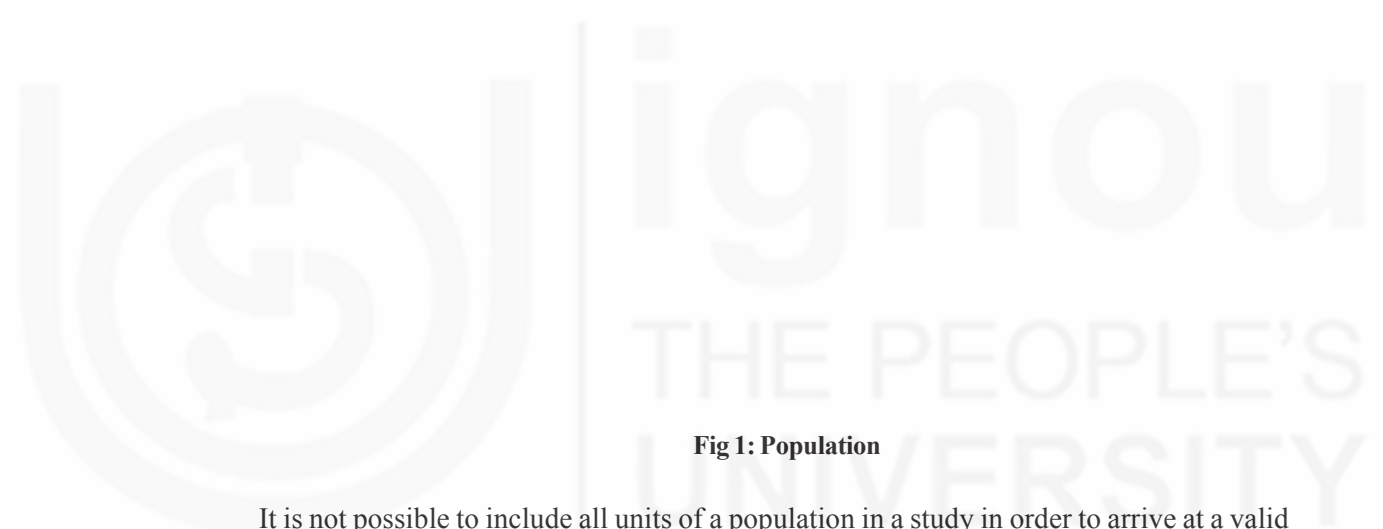


Fig 1: Population

It is not possible to include all units of a population in a study in order to arrive at a valid conclusion. Moreover, the sizes of populations are often so large that the study of all the units would not only be expensive but also cumbersome and time consuming. For example, there are more than **fifty thousand undergraduate students in IGNOU**. For our research, it is impossible to collect information about the study habits of all these students. So, for the survey a researcher will have to select a representative few, i.e., a sample from the population. This process is known as **sampling**.

If the nature of the population has to be inferred from a sample, it is necessary for the sample to be truly representative of the population. Moreover, it calls for drawing a representative ‘proportion’ of the population. The population may contain a finite number of members or units. Sometimes, the population may be ‘infinite’ as in the case of air pressure at various points in the atmosphere. Therefore, a population has to be defined clearly so that there is no ambiguity as to whether a given unit belongs to the population or not. Otherwise, a researcher will not know what units to consider for selecting a sample. For example, we want to understand the study habits of distance education students. Here, the population is not well defined : we are not told about the university/ universities that have to be included in this survey. After all, there are more than

hundred universities in India, that provide distance education and there are **thirteen state open universities**. Hence, to define it accurately, we have to specify the group as, say, undergraduate students of IGNOU.

The second issue related to the **representativeness** of a sample is to decide about the 'sampling frame', i.e., listing of all the units of the population in separate categories. In the above study, there can be different sampling frames, such as male/female students, employed/unemployed students, etc. The sampling frame should be complete, accurate and up-to-date, and must be drawn before selecting the sample.

Thirdly, a sample should be **unbiased** and **objective**. Ideally, it should provide all information about the population from which it has been drawn. Such a sample, based on the logic of induction, i.e., proceeding from the particular to the general, falls within the range of random sampling errors. This leads us to the results expressed in terms of "probability".

A sample should not only be representative, but should also be **adequate** enough to render stability to its characteristics. What, then, is the ideal size of a sample? An adequate sample is the one that contains enough cases to ensure reliable results. If the population under study is homogeneous, a small sample is sufficient. However, a much larger sample is necessary, if there is greater variability in the units of population. Thus the procedure of determining the sample size varies with the nature of the characteristics under study and their distribution in the population. Moreover, the adequacy of a sample will depend on our knowledge of the population as well as on the method used in drawing the sample. For example, if we try to find out the study habits of undergraduate students of Lady Irwin College, Delhi, the population will obviously be more homogeneous than the population of undergraduate students of IGNOU, with respect to socio-economic status, employment of students or study hours available. However, it should be understood that the adequate size of the sample does not automatically ensure accuracy of results.

Check Your Progress 1

Define Sampling.

Notes: (a) Answer in the space given below.

(b) Compare your answer with the one given at the end of this Unit.

1.3 METHODS OF SAMPLING

In the last section, we suggested that the method used for drawing a sample is significant to arrive at dependable results or conclusions. With this fact in view, here in this section, we shall now talk about the various sampling methods. Sampling methods can be broadly classified into two categories:

i) Probability Sampling

ii) Non-probability Sampling

1.3.1 Probability Sampling

Probability sampling is based on random selection of units from a population. In other words, the sampling process is not based on the discretion of the researcher but is carried out in such a way that the probability of every unit in the population of being included is the same. For example, in the case of a lottery, every individual has equal chance of being selected. Some of the characteristics of a probability sample are :

- i) each unit in the population has some probability of being selected in the sample,
- ii) weights appropriate to the probabilities are used in the analysis of the sample and
- iii) the process of sampling is automatic in one or more steps of the selection of units in the sample.

Probability sampling can be done through different methods, each method having its own strengths and limitations. A brief account of these is given below:

Simple or unrestricted random sampling

Simple random sampling is a method of selecting a sample from a finite population in such a way that every unit of the population is given an equal chance of being selected [see item (i) above]. In practice, you can draw a simple random sample unit by unit through the following steps:

- i) Define the population
- ii) Make a list of all the units in the population and number them from 1 to n.
- iii) Decide the size of the sample, or the number of units to be included in the sample.
- iv) Use either the 'lottery method' or 'random number tables' to pick the units to be included in the sample.

For example, you may use the lottery method to draw a random sample by using a set of 'n' tickets, with numbers '1 to n' if there are 'n' units in the population. After shuffling the tickets thoroughly, the sample of a required size, say x, is selected by picking the required x number of tickets. The units which have the serial numbers occurring on these tickets will be considered selected. The assumption underlying this method is that the tickets are shuffled so that the population can be regarded as arranged randomly. Similarly, while selecting 500 students from the total population of 50000 undergraduate students of IGNOU, you will write the roll numbers of all the students on small pieces of paper. Jumble the chits well and then choose five hundred roll numbers.

The best method of drawing a simple random sample is to use a table of random numbers. These random number tables have been prepared. Fisher and Yates (1967). After assigning consecutive numbers to the units of population, the researcher starts at any point on the table of random numbers and reads the consecutive numbers in any direction horizontally, vertically or diagonally. If the read out number corresponds with the one written on a unit card, then that unit is chosen for the sample.

Let us, suppose that a sample of 5 study centers is to be selected at random from a serially numbered population of 60 study centers. Using a part of a table of random numbers reproduced here, five two digit numbers (as the total population of study centers, 60, is a two digit figure) are selected from Table 1.

Table 1: An Abbreviated Table of Random Numbers

Row ► Column ▼	1	2	3	4	5	...	n
1	2315	7548	5901	8372	5993	...	6744
2	0554	5550	4310	5374	3508	...	1343
3	1487	1603	5032	4043	6223	...	0834
4	3897	6749	5094	0517	5853	...	1695
5	9731	2617	1899	7553	0870	...	0510
6	1174	2693	8144	3393	0862	...	6850
7	4336	1288	5911	0164	5623	...	4036
8	9380	6204	7833	2680	4491	...	2571
9	4954	0131	8108	4298	4187	...	9527
10	3676	8726	3337	9482	1569		3880
11	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...
n	3914	5218	3587	4855	4881	...	5042

If you start with the first row and the first column, 23 is the first two-digit number, 05 is the next number and so on. Any point can be selected to start with the random numbers for drawing the desired sample size. Suppose the researcher selects column 4 from row 1, the number to start with 83. In this way he/she can select first 5 numbers from this column starting with 83. The sample, then, is as follows:

83	75
53✓	33✓
40✓	01✓
05✓	26✓

Now, in selecting the sample of 5 study centers, two numbers, 83 and 75, need to be deleted as they are bigger than 60, the size of the population. The processes of selection and deletion are stopped after the required number of five units get selected. The selected numbers are 53, 40, 05, 33 and 01. If any number is repeated in the table, it may be substituted by the next number from the same column. The researcher will go on to the next column until a sample of the desired size is obtained.

Simple random sampling, ensures the best results. However, from a practical point of view, a list of all the units of a population is not possible to obtain. Even if it is possible, it may involve a very high cost which a researcher or an organisation may not be able to afford. Therefore, simple random sampling is difficult to realize. Also, in case of a heterogeneous population, a simple random sample may not necessarily represent the characteristics of the total population, even though all selected units participate in the investigation. In the case of undergraduate students of the Open University in your country (assuming you have one), students may be employed in different sectors and categories of services/industries. In spite of your best efforts you may not be able to list all the categories of employment. In such a case, simple random sampling cannot help in representing all the categories under study.

Systematic sampling

Systematic sampling provides a more even spread of the sample over the population list and leads to greater precision. The process involves the following steps:

- i) Make a list of the population units based on some order - alphabetical, seniority, street number, house number or any such factor.
- ii) Determine the desired sampling fraction, say 50 out of 1000; and also the number of the Kth unit. [$K = N/n = 1000/50 = 20$].
- iii) Starting with a randomly chosen number between 1 and K, both inclusive, select every Kth unit from the list. If in the above example the randomly chosen number is 4, the sample shall include the 4th, 24th, 44th, 64th, 84th units in each of the series going upto the 984th unit.

This method provides a sample as good as a simple random sample and is comparatively easier to draw. If a researcher is interested to study the average telephone bill of an area in his/her city, he/she may randomly select every fourth telephone holder from the telephone directory and find out their annual telephone bills. However, this method suffers from the following drawbacks because of departure from randomness in the arrangement of the population units.

i) Periodic effects

Populations with more or less definite periodic trend are quite common. Students' attendance at a residential university library open seven days in a week, sales of a store over twelve months in a year and flow of road traffic past a particular traffic point on a road over 24 hours are a few examples to show periodic trend or cyclic fluctuation in a given population. In such cases systematic sample may not represent the population adequately or remain effective all the time.

ii) Trend

Another handicap of systematic sampling emerges from the fact that very often 'n' is not an integral multiple of 'k'. This leads to a varying number of units in the sample from the same finite population. Suppose a population of 100 counsellors is listed according to seniority and a researcher wants to select a sample of 20. First he/she divides 100 by 20 to get 5 as the size of the interval. Suppose he/she picks 4 at random from 1 to 5 as a starting number. Then, he/she selects each 5th name at 9, 14, 19, until he/she draws the desired 20 names. If he/she picks 2 as the starting point, another sample would consist 2, 7, 12, In the latter sample each counsellors seniority is lower than his/her counterpart in the former sample. The mean average of these two samples would be significantly divergent as regards seniority and other associated variables. Many such samples can be drawn by taking different starting points but there will be greater variation among them. Thus, the 'periodic effects' and 'trend' of the listed population unduly increase the variability of the samples, and calculations made from such samples cannot show the sources of variability.

The main advantages of systematic sampling are:

- a) It involves simple calculations.
- b) It is less expensive than random sampling.

Stratified Random Sampling

In some cases, the population to be sampled is not homogenous. Therefore, rather than selecting randomly from the entire population the main population is divided into a number of sub-populations called strata, each of which is homogeneous with respect to one or more characteristic(s). The sample elements are then selected from each stratum at random. Thus, all strata are represented in the sample. This approach to sampling is called stratified random sampling because the population is stratified into its sub-populations and the condition of random selection is included by the selection within the strata..

The steps involved in the stratified sampling are given as follows:

- i) Deciding upon the relevant stratification criteria such as sex, geographical region, age, courses of study, etc.
- ii) Dividing the total population into sub-populations based on the stratification criteria.
- iii) Listing the units separately in each sub-population.
- iv) Selecting the requisite number of units from each sub-population by using an appropriate random selection technique.
- v) Consolidating the sub-samples for making the main sample.

Thus, stratification improves the representativeness of a sample by introducing a secondary element of control. However, the efficiency of the stratified random sample depends on the allocation of sample size to the strata. There are three types of allocation in stratified random sampling:

1. Equal Allocation

In this type, all strata contribute the same number of sampling elements to the sample. Thus, if there are three strata, one third of the sample would be selected from each stratum. This type of allocation is done when strata have equal population.

2. Proportional Allocation

In this type, all strata contribute to the sample a number that is proportional to its size in the population. The larger the stratum, the more members it contributes to the sample. The sampling fraction remains constant. Suppose there are five strata to be sampled and the respective population sizes of the strata are as follows and 5% stratified random sample is to be selected. The proportional allocation will be done as follows:

Strata	Strata Sizes	Sample Size by Strata
I	5000	250
II	1800	90
III	2000	100
IV	3500	175
V	450	23(22.5)
N=12750		
Sample size= 638(637.5 rounded off)		

Rendering proportional weightage to each criterion improves it further by allowing the use of a smaller sample and by helping in achieving higher efficiency at a reduced cost

3. Optimum Allocation

In optimum allocation, the strata contributions to the sample are proportional to the product of the strata population sizes and the variability of the dependent variable within the strata. Large strata and strata with large variability will have larger contributions to the sample. Because of the requirement of good estimates of population variability of dependent variable, which is seldom available before the sample is selected, The optimum allocation is used infrequently.

Stratified random sample is useful when lists of units or individuals in the population are not available. It is also useful in providing more accurate results than simple random sampling. For example, while selecting a sample of undergraduate students of the Open University in your country, the researcher may decide the whole population of undergraduate students as males and females, north, east, south and west regions of the country and then employed in government, private and autonomous institutions in the country. All these will be different strata. From each stratum researcher may select 50

students as a sample. Sometimes stratification is not possible before collecting the data. The stratum to which a unit belongs may not be known until the researcher has actually conducted the survey. Personal characteristics such as sex, social class, educational level, age etc., are examples of such stratification criteria. The procedure in such situations involves taking of a random sample of the required size and then classifying the units into various strata. The method is quite efficient provided the sample is reasonably large, i.e., more than 20 in every stratum.

Cluster sampling

Cluster sampling is used when the population under study is infinite, where a list of units of population does not exist, when the geographic distribution of units is scattered, or when sampling of individual units is not convenient for several administrative reasons. It involves division of the population into clusters that serve as primary sampling units. A selection of the clusters is then made to form the sample. Thus, in cluster sampling, the sampling unit contains clusters instead of individual members or items in the population.

For example, for the purpose of selecting a sample of high school teachers in a state, you may enlist all high schools instead of teachers teaching in high schools and select randomly a 10 per cent sample (say) of the schools as clusters. You may then use all the teachers of the selected schools as the sample or randomly select a few of them.

Any location within which we find an intact group of similar characteristics (population members) is termed as a cluster. Examples of cluster include classrooms, schools, hospitals, and study centers. Cluster sampling is economic, especially when the cost of measuring a unit is relatively small and cost of reaching it is relatively large.

Multi-stage sampling

Multi-stage sampling is used in large scale surveys for a more comprehensive investigation. The researcher may have to use two, three or even four stage sampling. For example, in surveys mailed questionnaires are generally used to gather information from people living in widely scattered areas. Although the method is cost effective, partially completed questionnaires may introduce a bias due to which a representative sample cannot be obtained. To overcome this bias, two-stage sampling has to be used. A second sample from non-respondents is selected at random by contacting them personally. In this way the consistency of the data obtained from the first sample can also be verified. Similarly, if a researcher goes for a national survey of counsellors, he/she can draw a sample of five states representing northern, eastern, southern, western and central regions. From these five states, all the districts can be enlisted out of which a sample of 30 to 40 districts can be drawn randomly. Out of this, all the study centers in different districts can be enumerated. A random sample of about 300 to 400 study centers is then drawn. Further, a random sample of about 1500-2000 counsellors are drawn for the survey. The successive random sampling of states, districts, study centers and finally counsellors also provides a multi-stage sample. Multi-stage sampling is advantageous as the burden on the respondents is lessened, it is cost effective, time saving and efficient in formulating the sub-sample data. However, this method is recommended only when it seems impractical to draw a simple random sample.

Probability proportion to size sampling

When the units vary in size, it is better to select a sample in such a way that the probability of selection of units is proportional to its size. For example, a particular study center has a population of 200 learners and another one has 100. While drawing a sample, the first study center will have double the representation as compared to the second study center. Such a sample is known as probability proportion to size sample or PPS sample.

Using Computer for Sample Selection

There are a number of websites that will generate random numbers for you. For e.g., website www.randomizer.org is very easy to use. On opening this website you will have to answer a series of questions such as how many sets of random numbers to be generated; how many numbers per set to be produced ; number range etc.

Many software packages include programmes for selecting a random sample. One such package is Statistical Package for Social Sciences (SPSS) for Windows 15.0 (SPSS, Inc., 2006). SPSS has two options for specifying the size of random sample:

- a. Exactly
- b. Approximately

Exactly, as the name suggests, requires exact/specific number like 600 from 2000 Class IX students listed. Whereas the second option specifies the sampling fraction i.e. the ratio of sample size to population size, e.g. 30 percent of all the Class IX students could be selected.

A number of other software packages are also available that provide the scope for the selection of a random sample other than a simple random sample. You may use any programme following the instructions given in the manual for the software.

Check Your Progress 2

List the various types of probability sampling.

Notes: (a) Answer in the space given below.

(b) Compare your answer with the one given at the end of this Unit.

1.3.2 Non-probability Sampling

Non-probability sampling also called non random sampling refers to the sampling methods that do not have random sampling at any stage of sample selection. Since it is not possible to specify what probability each member of population has of being selected for the sample, the term non probability sampling is also used for the same. This sampling is based on the judgement of the researcher. The guiding factors in non-probability sampling include the availability of the units, the personal experience of the researcher and his/her convenience in carrying out a survey. Since it is not possible to specify what probability each member of population has of being selected for the sample these samples are known as non-probability samples. Depending on the technique used, non-probability samples are classified into **incidental, quota** and **purposive samples**. A brief description of these samples is given below.

Incidental sample

The term incidental sample, also known as accidental sample or convenience sample, is applied to samples that have been drawn because of the easy availability of units. An investigator employed in the IGNOU may select learners enrolled in MDE programme and who happen to visit the university for one or the other work while conducting a study on the perception of distance learners towards MDE. These learners are readily available and fulfil the conditions of the study. However, it is the limitation that though they have defined population but no randomization has actually been done. Therefore any attempt to arrive at generalised conclusion in such cases will be erroneous and misleading. The merits of this procedure are mainly the convenience of obtaining units, the ease of testing and completeness of the data collected.

Quota sample

Quota sample is another type of non-probability sample which is most often used in survey research when it is not possible to list all the members of population of interest. It involves the selection of sample units within each stratum on the basis of the judgement of the researcher rather than on calculable chance of the individual units being included in the sample. Suppose a national survey has to be done on the basis of quota sampling. The first step in quota sampling would be to stratify the population region wise like rural/urban, administrative districts etc. and then fix a quota of the sample, i.e. how many from each stratum, to be selected. In the initial stage quota sampling is similar to stratified sampling. However, it may not necessarily employ random selection procedure in the initial stage in exactly the same way as probability sampling. The essential difference between probability sampling and quota sampling lies in the selection of the final sampling units. The quota is usually determined by the proportion of the groups. Suppose a researcher wants to study the attitude of university teachers towards distance education. First of all, he/she may stratify the university teachers in the category of sex and then as professors, readers and lectures. Later, he/she may fix quotas for all these categories. In this way, the quota sample would involve the use of strata but selection within the strata is not done on a random basis. The data are obtained from the easily accessible individuals. Thus, members who are less accessible are under represented. The advantages of quota sampling are, its being less expensive, convenient, and more suitable in the case of missing or incomplete sampling frames.

Purposive sample

A purposive sample is also known as a judgement sample. This type of sample is chosen because there are good reasons to believe that it is a representative of the total population. The researcher selects a sample based on his /her experience or knowledge of the group to be sampled. For example, for study of 'gifted' children, the researcher, on the basis of his/her past experience, selects certain individuals giving extra ordinary performance in school while excluding all others from the sample.

A purposive sample differs from convenience sample in that the researcher uses experience and prior knowledge to identify criteria for selecting the sample rather than selecting those who happen to be available. It is the clear criteria which forms the basis for describing purposive and defending purposive samples. Much of the sampling in qualitative research is purposive as the primary focus is on identifying subjects who can provide rich information for in-depth study about the particular topic and setting, not subjects who necessarily represent some larger population. Representativeness is secondary to the quality of the participants' ability to provide the desired information.

Within the domain of purposive sampling are about 16 different types of specific approaches that may be used in qualitative researches. A few among these are:

Random purposive sampling When the purposive sample is larger than one can handle, one may select a required number of subjects from the purposively selected subjects. This is known as random purposive sampling technique. For example, if 20 potential participants were purposively identified by the researcher, but only 10 participants could be studied, a random sample of 10 from the 20 potential participants would be chosen.

Snowball sampling: It involves selecting a few people who can identify still others who might be good participants for a study. For example, When interviewing members of a population, you can ask the interviewed persons to nominate other individuals who could be asked to give information or opinion on the topic. You then interview these new individuals and continue in the same way until the material gets saturated, i.e. you get no new viewpoints from the new persons. For example, a researcher wishes to study the opinion of distance learners towards quality of Gyanvani programmes but can find only five who listen to these programmes. She asks these students if they know any more. They give her several further referrals who in turn provide additional contacts. In this way she manages to contact sufficient Gyanvani listeners.

Snowball sampling is most useful when we do not have access to sufficient people with the characteristics we are seeking, like in a situation when possible participants are scattered or not found in clusters, for such populations that are not well delimited nor well enumerated, for example the homeless.

The drawback is that you get no exact idea of the factual distribution of the opinions in the target population. Besides, people usually propose people that they know well and who share their own views, which means that small groups of interest often are passed by unnoticed. One method for compensating this could be asking people to nominate both such persons who share the same views and such persons who are of the opposite

opinion. Another method is to start the snowball chain from not one but several different people, perhaps from different social groups.

Intensity sampling: This refers to selecting information rich cases that manifest the phenomenon intensely and permit study of different levels of research topic but not extreme or deviant cases, for example good students/ poor students, above average/ below average, experienced /inexperienced distance tutors. Intensity sampling requires prior information and exploratory work to be able to identify intense examples. One might use intensity sampling in conjunction with other sampling methods. For example, one may collect 50 cases and then select a subset of intense cases for more in depth analysis.

Homogenous sampling: This refers to selecting participants who are very similar in experience, perspective, or outlook. This reduces variation and simplifies data collection and analysis. Like instead of having the maximum number of students enrolled in all professional programmes offered through distance mode it may focus on one programme say B.Ed.only.

Stratified purposive sampling: This illustrates characteristics of particular subgroups of interest and facilitates comparisons between the different groups.

Criterion sampling: Here, you set a criteria and pick all cases that meet that criteria or have some characteristic for example, all distance tutors with 10 years of experience, all distance learners who dropped out from the formal system but completed the programme through distance mode. This method of sampling is very strong in quality assurance.

Extreme and deviant case sampling: This involves learning from highly unusual manifestations of the phenomenon of interest, such as outstanding successes, notable failures.

The non-probability samples are generally considered to be convenient when the sample to be selected is small and the researcher wants to get some idea of the population characteristics within a short time. In such cases, the primary objective of the researcher is to gain insight into the problem by selecting only those persons who can provide maximum insight into the problem.

However, the following are some inherent limitations of non-probability sampling methods:

- i) No statistical theory has been devised to measure the reliability of results derived through purposive or other non-random samples. Hence, no confidence can be placed in the data obtained from such samples and results cannot be generalized for the entire population.
- ii) The selective sampling based on convenience affects the variance within the group as well as between the groups. Further, there is no statistical method to determine the margin of sampling errors.
- iii) Sometimes such samples are based on an obsolete frame which does not adequately cover the population.

1.3.3 Choice of the Sampling Method

The choice of sampling method depends on several considerations unique to each individual project. These include issues related to the definition of population, availability of information about the structure of the population, the parameters to be estimated, the objectives of the analysis including the degree of precision required, and the availability of financial and other resources. This calls for appropriate selection of a sample for the conduct of any research study.

1.3.4 Characteristics of a Good Sample

A good sample should have the characteristics of (i) Representativeness and (ii) Adequacy.

It is essential that the sample should be 'representative' of the population if the information from the sample is to be generalized for that population. The term representative sample means an ideal 'miniature' or 'replica' of the population from which it has been drawn. In other words, the average of the attributes of sample elements is the same or very near to the average in the population.

A good sample should also be 'adequate' or of sufficient size to allow confidence in the stability of its characteristics. An adequate sample is considered to be one that contains enough cases to ensure reliable results. Hence, planning the size of the sample in advance is very important. It varies with the nature of the characteristics under study and its distribution. It may be mentioned that representativeness and adequacy do not automatically ensure accuracy of results. The sampling and data collection techniques need to be selected and employed carefully to obtain higher degrees of precision in results and generalizations about the population.

1.3.5 Determination of Sample Size

Most researchers find it difficult to determine the size of the sample. Krejcie and Morgan (1970) has given a table in which no calculations are needed to determine the size of the sample. Table is reproduced here for your reference.

Table for Determining Sample Size from a Given Population

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320

50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note – N is population size, S is sample size

Let us take one example. If you want to know the sample size required to be representative of the opinions of 300 academic counsellors, refer table at N=300. The sample size representative of the counsellors in this case will be 169. The table given above is applicable to any defined population.

Sample sizes in qualitative research are typically small. Infact, the validity, meaningfulness, and insights generated from qualitative inquiry have more to do with the information-richness of the cases selected and the observational /analytical capabilities of the researcher than with sample size. There are no definite rules to be followed and determining adequate sample size in qualitative research is ultimately a matter of judgement and experience. Typically, one should continue sampling until having achieved informational redundancy or saturation—the point at which no new information or themes

are emerging from the data. To know if the informational redundancy or saturation is reached it is essential that data collection and analysis go hand in hand. In other words, data is collected and analysed, at least in a preliminary fashion, side by side and this analysis informs subsequent data collection decisions.

Check Your Progress 3

1. Describe the various types of non-probability sample.
2. Discuss the characteristics of a good sample.

Notes: (a) Answer in the space given below.

(b) Compare your answer with the one given at the end of this Unit.

1.4 KEY POINTS AT A GLANCE

1. A population is a well defined group of units: individuals, objects, attributes, qualities, characteristics, traits of human beings, etc.
2. A sample is a small representation of a population. It is a miniature picture of the entire group from which it has been selected.
3. To obtain a representative sample, you must select the unit in a specified way. This process is called sampling. It usually involves the following four steps: (i) Defining the population; (ii) Listing the population; (iii) Selecting a representative sample; and (iv) Obtaining an adequate sample.
4. Sampling methods can be classified into two broad categories: (i) Probability sampling and (ii) Non-probability sampling.
5. In probability sampling the units of the population are not selected at the discretion of the researcher but by means of certain procedures which ensure that every unit of a population has the same probability of being included in the sample.

6. Simple or unrestricted random sampling, systematic sampling, stratified sampling, cluster sampling, multi-stage sampling and probability proportion to size sampling are the six main types of probability sampling. In all these types each unit in the sample has some known probability of entering the sample.
7. In simple or unrestricted random sampling each unit of the population is given an equal chance of being selected, and the selection of any one unit is in no way tied to the selection of any other. The law of chance is allowed to operate freely in the selection of such samples and carefully controlled conditions are created to ensure that each unit in the population has an equal chance of being included in the sample.
8. The researcher may use the lottery method or a table of random numbers for drawing a simple random sample.
9. Simple random sampling ensures best results. However, it is neither feasible nor possible if the lists of the units do not exist or if such lists are incomplete.
10. If there is more heterogeneity among the units of the population, a simple random sample may not necessarily represent the characteristics of the total population even if all selected units participate in the investigation.
11. In systematic sampling, a researcher generally starts with a list in which all the N units of the population are listed in alphabetical or in any other order. To select a sample of size n , the researcher has to select a unit at random from the first $k = (N/n)$ units of the list and then every subsequent k th unit is selected.
12. A systematic sample is as good as a simple random sample and is comparatively more convenient to draw. However, the characteristics of “trend”, “cyclical fluctuations” and “periodic effects” of a listed population unduly increase the variability of samples.
13. When the units in a sample are proportional to their presence in the population, the sampling is said to be stratified.
14. When a population is stratified, the units within each stratum are more or less homogeneous than the units within the entire population.
15. Stratified random sampling is very useful when lists of units or individuals in the population are not available. This method has been found practical even for small finite populations when cent per cent response is difficult to secure within the desired time.
16. Stratified random sampling provides more accurate results than simple random sampling only if stratification results in greater homogeneity within the strata than in the whole population taken as one unit. It is particularly useful in opinion survey studies.
17. Cluster sampling is used when the population under study is infinite, where a list of units of the population does not exist, when the geographical distribution of units is scattered, or when sampling of individual units is not convenient for various practical purposes.
18. Cluster sampling involves division of the population of elementary units into groups of elements or clusters instead of individual members or items in the population.

Tools for Research

19. Cluster sampling is economical, especially when the cost of measuring a unit is relatively small and cost of reaching it is relatively large.
20. Multi-stage sampling is used in large scale surveys for a more comprehensive investigation. In this type of sampling, the researcher may have to use two, three or even four stages of sampling.
21. Multi-stage sampling is comparatively convenient, less time consuming and less expensive. However an element of sample bias gets introduced because of the unequal size of some of the selected sub-samples.
22. When the units vary in size, it is better to select a sample in which the probability of selection of a unit is proportional to its size. This sample is known as probability proportion to size sample or PPS sample.
23. Non-probability sampling is based on the judgement of the researcher. Its guiding principles are: (i) availability of sampling units; (ii) personal experience of the researcher, and (iii) the researcher's convenience in conducting the research. Since this type of sampling does not involve the principle of probability, it is called non-probability sample.
24. Non-probability sampling provides (i) purposive samples, (ii) incidental samples, and (iii) quota samples.
25. A purposive sample is arbitrarily selected because there is good evidence that it is a representative of the total population. The evidence is based on researcher's experience.
26. An incidental sample is generally used with those groups which are selected because of the easy or ready availability of sample units.
27. A quota sample involves selection of the sample units within each stratum or quotas on the basis of the judgement of the researcher rather than on calculable chance of being included in it.
28. Non-probability samples are very convenient in situations where the sample to be selected is very small and the researcher wants to get some idea of the characteristics of a population in a shorter time.
29. Non-probability samples have certain limitations. No valid generalisations can be made beyond the sample studied. These samples depend exclusively on uncontrolled factors and the researcher's insight. Hence, the sampling error of such samples is hardly determinable.
30. The choice of an appropriate sampling method by a researcher depends upon many factors. These include (i) defining the population, (ii) availability of information about the structure of population, (iii) the parameters to be estimated, (iv) the objectives of the analysis including degree of precision required, and (v) the availability of financial and other resources.
31. Representativeness and adequacy are the major characteristics of a good sample.

1.5 LET US SUM UP

In this Unit we discussed the concept of population and sample, and the two methods of sampling, namely, probability and non-probability sampling. Under ‘probability sampling’ we discussed its various types such as simple sampling or unrestricted random sampling, systematic sampling, stratified sampling, cluster sampling and multi-stage sampling. Under ‘non-probability’ sampling we discussed purposive sample, incidental sample, quota sample and also touched upon the choice of sample. We ended this Unit with a description of the characteristics of a good sample: representativeness and adequacy.

1.6 GLOSSARY

1. **Population:** A population is any group of individuals or units that have one or more characteristics in common and are of interest to the researcher. It may consist of all the units or individuals of a particular type or a more restricted part of that group.
2. **Sample:** A sample is a small proportion of a population selected for analysis. By observing the sample, certain inferences may be drawn about the population. Samples are not selected haphazardly, but deliberately, so that the influence of chance or probability can be estimated.
3. **Probability:** Probability is the ratio of the number of ways in which a favoured way can occur to the total number of ways the event can occur. It may range from zero, when there is no chance whatever, of the favoured event, to 1.0, where there is absolute certainty that nothing else could happen.
4. **Probability sampling:** In probability sampling, the units of a population are not selected at the discretion of the researcher but by means of certain procedures which ensure that every unit of the population has one fixed probability of being included in the sample. It is a procedure of drawing the units of a population in such a way that every unit has an equal and independent chance of being included in the sample.
5. **Nonprobability sampling:** In non-probability sampling, the units are selected at the discretion of the researcher. The researcher uses his/her judgement or experience while selecting the sample.
6. **Sampling frame:** A complete, accurate, and up-to-date list of all the units in a population is called a sampling frame.
7. **Representative sample:** representative sample is one that matches with its corresponding population with respect to the characteristics important for the research.
8. **Parameter:** Measures which describe a population are called parameters.
9. **Statistics:** The measures estimated from the samples are called statistics.
10. **Sampling error** The ‘statistics’ estimated from samples tend to differ more or less from sample to sample drawn from the same population due to sampling fluctuations. On the other hand, the ‘parameter’ is considered to have a fixed reference value. It is not possible to compute parameter but there is a statistical

procedure to forecast the parameter from sample statistics provided certain conditions have been satisfied. The difference between the sample estimate (statistics) and the population value (parameter) is called the 'sampling error'.

11. Biased sample: A sample that is not representative is known as a biased sample. Biases may be due to imperfect tools or instruments, personal qualities of the researcher, techniques or other causes.

1.7 CHECK YOUR PROGRESS: THE KEY

1. Sampling is the process of selecting a sample which is a small representation of a large whole or group. A sample should represent truly and adequately the larger whole. A sampling frame should be complete, accurate, up-to-date, unbiased and objective.
2. Sampling or unrestricted random sampling, systematic sampling, stratified sampling, cluster sampling, multi-stage sampling and probability proportion to size sampling (PPS) are the important types of probability sampling.
3. (A) Non-probability sampling includes (i) purposive sample, (ii) incidental sample and (iii) quota sample.
 - Purposive sample is useful when we have to include a very small number of units in a given sample.
 - Incidental sample is generally applied in the case where units are easily or readily available.
 - Quota sample involves the selection of sample units within each stratum or quota on the basis of the judgement of the researcher.

Sample units are not included accidentally or at random.

(B) A good sample must be

- representative of the population chosen
- adequate and
- accurate.

References

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UNIT 2 RESEARCH TOOLS-I

Structure

- 2.0 Introduction
- 2.1 Objectives
- 2.2 Scaling in Educational Research
- 2.3 Characteristics of a Good Research Tool
 - 2.3.1 Validity
 - 2.3.2 Reliability
 - 2.3.3 Usability
- 2.4 Types of Tools and their Uses
 - 2.4.1 Questionnaire
 - 2.4.2 Rating Scale
 - 2.4.3 Attitude Scale
 - 2.4.4 Tests
- 2.5 Let Us Sum Up
- 2.6 Glossary
- 2.7 Check Your Progress: The Key

2.0 INTRODUCTION

Data collection is an important part of research. In order to collect the requisite data for any theme of research, you have to devise appropriate tools and use suitable measuring techniques, and decide on the relevant attributes of the samples drawn. There are several research tools, varying in design, operation, complexity of features, and interpretation. In certain situations you may select from a list of available tools. In other situations you may find that existing research tools do not suit your purpose or objective of research and, therefore, you may like to modify them or develop your own. Each tool is appropriate for collecting a particular type of data or information which lends itself to a particular type of analysis and interpretation for drawing meaningful conclusions and generalisations. For this, you need to familiarise yourself with the nature, merits and limitations of various research tools. In this unit we focus on the characteristics, types, uses and limitations of some commonly used research tools – questionnaires, rating scales, attitude scales and tests.

2.1 OBJECTIVES

On the completion of this Unit, you should be able to:

- Describe the characteristics of a good research tool,
- Define a questionnaire and describe its various types;
- Describe the characteristics, uses and limitations of a questionnaire;

- Define a rating scale and describe its types, uses and limitations;
- State the types, uses and limitations of attitude scale;
- Define a test and describe the types, uses and limitations of tests and
- Choose appropriate techniques and use them efficiently in your research projects.

2.2 SCALING IN EDUCATIONAL RESEARCH

Research tools are the measuring devices. Every measuring device has some kind of graduation depending upon the system of measurement. For example, the FPS or CGS systems measure length in foot or centimeter. Similarly weight is measured in pounds and grams. The footrule that measures length is graduated in inches. There are two major attributes – (1) each inch is of equal length wherever it appears on the footrule, (2) two different objects measured as two inches, for example by same footrule are of same length.

Just as FPS or CGS provides the basis for scaling for physical measurement, it is necessary to provide certain form of scaling for mental measurement – measurement of variables like intelligence, achievement, demographic, attributes, etc.

Four type of scaling are used in measurement. These are:

- **Nominal,**
- **Ordinal,**
- **Interval and**
- **Ratio.**

Nominal Scale: It is the most elementary form of the scale. As indicated by the name itself it is only nominal. This form of scale is largely used to classify people or object in certain categories like male-female, rural-urban, dark-light, tall-short etc. In other words, it labels object of measurement. In the context of research it is concerned with the frequency of occurrence in the various categories. For example in a class or in a counselling session how many are male or how many are female students or how many have read the learning material or how many have not read the material.

Ordinal Scale: This is the second level of scale which is more sophisticated than the nominal scale, though remains in one of the cruder forms. Wherever the sample of the research is arranged in ascending or descending order on the basis of data on a variable, we are using the ordinal scale, e.g., when the students are ranked in a class on the basis of their achievement we are using ordinal scale e.g., the 10th rank in a class of 50 students is better than 11th rank but lesser than the 9th. However, despite the ranking it does not indicate the difference between the 9th and 10th rank is equal to the difference between the 11th and 12th. In other words, the difference between the ranks are either unknown or unequal. The only information that is derived from this case is the relative position of a subject within the sampled population on a variable.

Interval Scale: As the name indicates the scale that intervals at different points of graduation is called interval scale. This is also called equally appearing interval scale. The most common use of interval scale is the achievement test when the test contains 100 as full marks, it implies 0 as the beginning. Hence 0 to 100 or 101 point scale where it is graded by one score at a time. This form of scale is extensively used in large majority of psychological variables like interests, attitudes, aptitude, etc. As mentioned earlier it is also called equally appearing intervals. There is a significant implication of the word appearing. Apparently the difference between 88 and 90. Since both have a scale difference of two points however practical experience will indicate that moving from 28 to 30 score points is far easier than moving from 88 to 90. In other words, despite the apparent difference of two, the actual difference between 88 to 90 is much larger than the difference 28 and 30. Although, it is by far the most sophisticated scale in social research, it has the limitation of being inexact compared to the ratio scale used in the physical measurement.

Ratio Scale: Ratio Scale as mentioned above is primarily used in physical measurement. It is exact and accurate. It is very similar to interval scale except that it has an absolute zero. For example, if a length is indicated by 0 cm., it means non-existence whereas a score of 0 in mathematics does not indicate the absence of mathematical knowledge. The other major feature of ratio scale is the ratio itself. It implies that in a 100 cm., or 1 meter long rod distance between the 28th and 30th cm., is exactly equal to the distance between the 80th and 90th cm., of the rod. In this case the intervals in the scale are not apparent but real. However, ratio scale has very little if at all application in social research in general educational research in particular. However, the basic philosophy of ratio scale is the basis of the interval scale that is extensively used in educational research.

As mentioned above, there are four types of scales Nominal, Ordinal, Interval and Ratio. The nominal scale and the ratio scale are the crude end and the sophisticated end of the continuum. The most extensively used scaling technique in educational research is interval scale. However, choice of scaling technique depend upon the nature of the variable.

2.3 CHARACTERISTICS OF A GOOD RESEARCH TOOL

There are mainly three characteristics of a good research tool. These include **validity**, **reliability**, and **usability**. In selecting tools for collecting data a researcher should evaluate them in terms of these characteristics. Let us discuss these one by one.

2.3.1 Validity

A tool used for collecting data must provide information that is not only relevant but free from systematic errors. In other words, it must produce only valid information and measure what it claims to measure. For example, an achievement test in Physics must measure knowledge of students in Physics alone. It should not turn out

to be a language test. If a question on frictional force is asked, and a certain student well versed in the English language writes a good 'essay' on it, the researcher should not end up measuring the language ability of the student. A tool, however, does not possess universal validity. It may be valid in one situation but not in another. The tool useful in deciding in a particular research situation may have no use at all for a different situation. So, instead of asking, "Is this research tool valid?" It is important to ask the more pertinent question, "How valid a particular tool is for collecting information which the researcher needs to gather?" Or, more generally, "For what decision is this tool valid?" There are three types of validity: **(i) content validity; (ii) criterion-related validity; (iii) construct validity.**

Content validity

Content validity relates to the relevance of the content of a research tool to the objective and nature of a research problem. For example, in the case of tests of achievement, content validity is estimated by evaluating the relevance of the test items to the instructional objectives, the actual subject studied, and the knowledge acquired individually and as a whole. Taken collectively, the items should constitute a representative sample of the variable tested.

Content validity of a research tool is based on the judgement of several experts in the field concerned, careful analysis of objectives of the subject of research and the hypotheses, if any, to be tested. Content validity is also known as **rational** or **logical validity** or **face validity**.

Criterion-related validity

In decision making situations, selection or classification is based on an individual's expected performance as predicted by a research tool. For example, a psychological test or rating scale which predicts the kind of behaviour it was intended to predict, is said to possess 'predictive validity'. The prediction may be regarding success in a job or a course. This validity, refers to the association between present result as indicated by a particular research tool and future behaviour. In order to determine the predictive validity of a tool, the results from it must be compared with the actual performance or outcome in the future. For example, if a test is designed to select students for a certain medical course, scores on the test must indicate a significant positive relationship with their ultimate success in the medical profession. A researcher studies predictive validity if his or her primary interest is in the outcome which he or she wants to improve by some professional decisions.

In some research situations, a researcher may wish to develop a new tool as a substitute for an already existing cumbersome tool (technique or method). If the existing tool is considered useful for decision making and we want to test the validity of the new one, the key question to ask is whether the new tool agrees with the information sought through the existing cumbersome technique. If they disagree, the new one cannot be substituted for the original tool. The agreement between the newly developed tool and the already existing cumbersome technique for which the tool has been developed, is

estimated by an empirical comparison. Both, the newly developed tool and the original one are applied to the same sample groups, and the results are compared. This type of empirical check on agreement is called concurrent validation, as the information obtained through the two tools ought to give nearly the same results. The validity of the new tool thus established is called its 'concurrent validity'. Let us suppose that a researcher has developed an achievement test in mathematics. The scores on this test may be compared with scores given by the mathematics teacher to the sample students. If the two tests show nearly the same result the concurrent validity of the researchers newly developed tool can be established.

In case of predictive validity, the measure of the outcome is termed 'criterion'. While estimating concurrent validity the newly developed tool is proposed as a substitute for the existing technique or method, and the information obtained through the existing technique acts as the criterion. Since in both the cases the information sought through the newly developed tool is related to a criterion, the two types of validation are also termed 'criterion-related validity'.

Construct validity

Construct validity is concerned with the extent to which a test measures a specific trait or construct. This type of validity is essential for those tests which are used to assess individuals on certain psychological traits and abilities. Examples of common constructs are anxiety, intelligence, motivation, attitude, critical thinking etc. Construct validity is established by relating a presumed measure of a construct with some behaviour that it is hypothesized to underlie.

2.3.2 Reliability

A tool used for data collection must be reliable, that is, it must have the ability to consistently yield the same results when it is repeatedly administered to the same individuals under the same conditions. For example, if an individual records his/her responses on various items of a questionnaire and thus provides a certain type of information, he/she should provide approximately the same type of responses when the questionnaire is administered to him/her on the second occasion. If an achievement test is administered to learners and then readministered after a gap of fifteen days without any special coaching in that subject, within these fifteen days, the learners must show similar range of scores on readministration of the test.

Repeated measure of an attribute, characteristic or a trait by a tool may provide different results. They may be due either to a real change in the individual's behaviour or to the unreliability or inconsistency of the tool itself. If the variation in the results is due to a real change in behaviour, the reliability of the tool is not to be doubted. However, if the variation is due to the tool itself, then the tool is to be discarded.

There are various procedures to assess the reliability of a tool. These include **(i) the test-retest method, (ii) the alternate or parallel-form method, (iii) the split half method, and (iv) the rational equivalence method.**

The test-retest method

In this method the same tool is re-administered to the same sample of population shortly after its first administration. The relationship or agreement between the information or data sought through the two administrations provides the measure of reliability of the tool. The chief disadvantage of this method is that if the time between two administrations of the tool is short, the immediate memory effects, practice and the confidence induced by familiarity with the tool may give a wrong measure of its reliability. On the other hand, if the interval is too long, the real changes in behaviour in terms of growth may under-estimate the reliability of the tool. Owing to these limitations, the test-retest method is generally less useful than the other methods. However, this type of measurement is commonly used with questionnaires, observations, and interviews.

The equivalent or parallel-forms method

This method requires that two equivalent or parallel forms of tool be prepared and administered to the same group of subjects. The items in these tests are parallel. Then, the results in terms of two sets of measures obtained by the use of the tool are correlated to measure the level of its reliability.

In developing the parallel forms of a tool, care has to be taken to match the tool material with the content, the difficulty level and the form. The parallel-form method is widely used for determining reliability of a research tool. The reliability of psychological tests and attitude scales is usually estimated by this method.

The split-half method

In this method, the tool is first divided into two equivalent 'halves'. If there are 50 items in a test, two equivalent halves are made of 25 items each. It may be done by having alternate items. The measure of the first half of the tool is correlated with the measure of the other half. The measures are correlated to find the reliability of tests and attitude scales. The main limitation of this method is that a tool can be divided into two halves in a number of ways and, thus, the estimate of the reliability may not have a unique value.

The rational equivalent method

This method of measuring reliability is considered to be free from the limitations of the other methods discussed so far. Two forms of a tool are defined as equivalent when their corresponding contents are interchangeable. This method is most commonly used in estimating the reliability of psychological tests.

2.3.3 Usability

The usability of a tool depends on its objectivity, cost effectiveness, the time and effort required to administer it, and how easy it is to analyse and draw conclusions through its use.

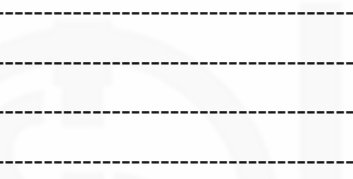
A tool should yield objective information and results. In other words, the results should be independent of the personal judgement of the researcher. If it cannot yield objective data, we say that it is not usable. If the tool can be administered in a short period of time, it is likely to gain cooperation of the subjects and save time of all those involved in its administration. The cost of construction, printing and administration of the tool should be reasonable. The simplicity and ease of administration, the scores and interpretation are also important factors to be considered while selecting a tool, particularly, when the expert advice is not easily available. The tool should interest and fascinate the subjects so that it may gain their cooperation.

Check Your Progress 1

Explain the terms Validity, Reliability and Usability in your own words.

Notes: (a) Answer in the space given below.

(b) Compare your answers with the one given at the end of this Unit.



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2.4 TYPES OF TOOLS AND THEIR USES

Questionnaires, interviews, rating and attitude scales, and tests, are the major data-gathering research tools. In the following sections and sub-sections we shall discuss these research tools.

2.4.1 Questionnaire

‘Questionnaire’ is a commonly used and frequently abused tool for gathering a variety of data. A questionnaire may include of a series of questions pertaining to psychological, social, educational, or any such issues which are sent to an individual or a group, with the aim of obtaining relevant data on the topic of research.

Types of questionnaires

Questionnaires can be classified in various ways. Here we confine ourselves to **structured** and **unstructured** questionnaires.

Structured questionnaires are those which pose definite, and concrete questions. They are prepared well in advance and not on the spot. Additional questions may be used only when there is a need to clarify vague or inadequate replies by respondents or when further details are needed. The form of questions may require responses which are either closed or open.

Closed-form of questionnaires are used when categorised data are required. They include a set of questions to which a respondent can reply in a limited number of ways — ‘yes’, ‘no’, ‘no-opinion’, or an answer from a short list of possible responses. Respondent is asked to put a tick (✓) mark in a space provided on the answer sheet or is requested to underline a response. Sometimes he/she is asked to insert brief answers of his/her own. The open ended responses on the other hand are free and spontaneous expressions by the respondent to the questions posed to him/her. The open-ended responses are used mainly for intensive study of a limited number of cases or preliminary exploration of new problems and situations. At times, the respondent is asked to write a descriptive essay and express his/her viewpoints or report on details and events, without restrictions imposed as in the case of closed questions.

Unstructured questionnaires are frequently referred to as interview guides. They also aim at precision and contain definite issues that are covered while conducting an interview. Flexibility is the chief advantage of the unstructured questionnaire. It is designed to obtain viewpoints, opinions, attitudes and to show relationships between various types of information which might escape notice under more mechanical types of interrogation. No predetermined responses are provided; instead, free responses are solicited.



Fig. 1: Filling up a Questionnaire

Characteristics of a good questionnaire

The characteristics of a good questionnaire can be analyzed by its:

1. Purpose

A good questionnaire must serve two purposes. First, it must translate the objectives of an investigation into specific questions, the answers to which will provide the data necessary to test the hypotheses and explore the area defined by the objectives. Each question should relate the corresponding objective so that the response obtained can be analysed and interpreted accordingly. The research objectives and specifications of the data required must precede the construction of questionnaire. Secondly, the questionnaire must motivate the respondents to communicate the required information. It is essential to include a courteous and carefully constructed covering letter to explain the purpose and importance of the study. The covering letter should assure the respondent that delicate information will be held in strict confidence.

2. Language

The language of a good questionnaire should be concise and directed towards producing uniformity of understanding among the respondents. The vocabulary should be simple and within the easy grasp of the least intelligent of the group under study. The syntax should be clear and straightforward. Vague phrases and expressions should be avoided. Technical expressions should be used only if the inquiry is directed to a select group which is well-versed in the technical language used. Proverbs and quotations should be avoided. Subjective words, such as 'bad', 'good', 'fair' and the like do not lend themselves to quantitative measurements nor qualitative analysis unless they are used for comparisons on a rating scale.

3. Frame of Reference

The respondent's frame of reference influences his/her answers. Complex questions that require the respondent to go through several steps of reasoning before answering are undesirable and have often resulted in misleading information. For example in a question like 'should study centers modernise their teaching', the word 'modernise' may have different connotations for different people.

Questions on controversial issues should be broken down into components, so that the researcher can determine the respondent's feelings about various aspects of the problem, including those which he/she refuses to comment upon. A series of specific questions is needed so as to uncover degrees of intensity of feeling or conviction. For example, questions to understand people's attitude towards the reservation policy have to be broken into issues like equality, equity, equal opportunities, etc.

The required answers should be within the informational domain of the respondents. For example a question 'Do you read 'Times'' may not bring the desired response as many respondents may not know about this magazine. The length of the questions and statements used should be governed by a reliable estimate of the respondents' comprehension level.

4. Arrangement of Questions

The arrangement or ordering of questions should receive special attention. It should appear logical to the respondents. The questions placed first in the questionnaire should be the easiest to answer. 'Interest-generating' questions should be asked at the beginning. A proper sequence of questions proceeds from the general to specific, from simple to complex ones, from those that will create favorable attitude to those that may be somewhat delicate or sensitive.

5. Length of the Questionnaire

A questionnaire should not be longer than necessary. The total number of questions must not be too large to tire or bore the respondents. If too many questions are asked and the respondent becomes tired, the questions at the end of the series may not be well answered. If it is necessary to include a large number of questions, it is advisable to have separate questionnaires.

6. Form of Response

The form in which the responses are recorded must be integrated with the form of the questions. There should be no hesitation in asking for responses in different forms in the same questionnaire, since it is frequently found that one form is better than another for questions about different aspects of the same subject. Questions requiring answers like "Yes" or "No" are subject to least bias. These responses are easy to tabulate. However, they do not always yield sufficient information on the subject under study. In such cases, the use of multiple choice responses is desirable. Questions that present multiple choices to the respondent are effective when the choices are few and easy to follow.

Uses of questionnaire

1. A questionnaire is a popular means of collecting different kinds of data in research. It is widely used in educational research to obtain information about certain conditions and practices, and to inquire into opinions of an individual or a group.
2. A questionnaire is administered personally either individually or to a group of individuals or is mailed to them to save a great deal of time and money in travel. In the former situation, the person administering the tool has an opportunity to establish rapport with the respondents, to explain the purpose of the study to the respondents and to explain the meaning of questions which may not be clear to them. In the latter situation, mailed questionnaire is mostly used when the individuals cannot be contacted personally. The range of administration of a mailed questionnaire may be national or international.
3. Questionnaires are used both to initiate a formal inquiry and also to supplement and check data previously accumulated. They may pertain to studies of economic or social problems, measurement of opinion on public issues or events, studies of administrative policies and changes, studies on the cost of living, consumer expenditure, child welfare, and numerous other issues.

Limitations of questionnaires

1. A questionnaire cannot be used with children and illiterates.
2. The return of the mailed questionnaire is often as low as 40 percent to 50 percent.

As a result of this poor response, the data obtained are sometimes of limited validity. The respondents who return the questionnaires may not be representative of the entire group. It will make the sample a biased one and thus vitiate the findings.

3. Sometimes respondents may not like to respond in writing to questions of intimate and confidential nature or to questions involving controversial issues. For example, it has been experienced that people avoid questions related to marriage and government servants avoid answering question about policy matters of the government.
4. It is sometimes difficult to formulate and phrase questions on certain complex and delicate problems.
5. There is no check on the respondent who misinterprets a question or gives incomplete or indefinite responses.
6. Sometimes the respondent may modify his/her earlier/original responses to the questions when he/she finds that his/her responses to latter questions are contradicting the previous ones.

Check Your Progress 2

Describe briefly the characteristics of a good questionnaire.

Notes: (a) Answer in the space given below.

(b) Compare your answer with the one given at the end of this Unit.

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2.4.2 Rating Scale

‘Rating’ is a term applied to an expression of opinion or judgement regarding some situation, object, character, or an attribute. ‘Rating scale’ refers to a ‘scale’ with a set of points which describe varying degrees of an attribute under investigation.

Rating scales are broadly classified into five categories:

- i) numerical scales,
- ii) graphic scales,
- iii) standard scales,
- iv) rating by cumulative points, and
- v) forced choice ratings.

We discuss them below in the same order.

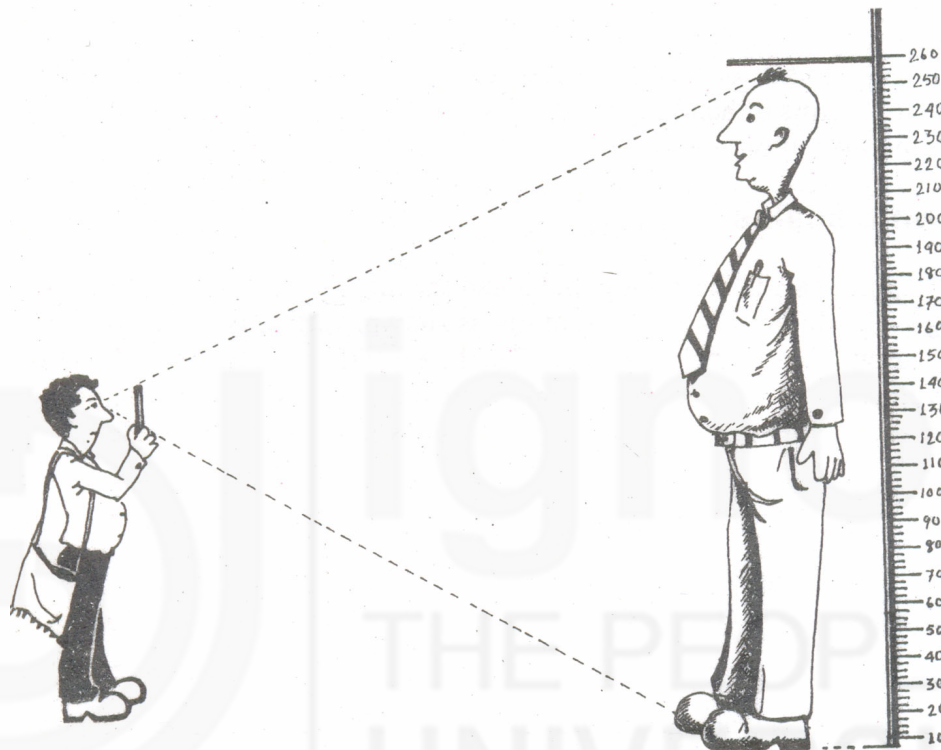


Fig. 2: How Tall are you

Numerical scales

In a typical numerical scale, a sequence of defined numbers is supplied to the rater or the observer. He/she assigns to each stimulus to be rated, an appropriate number in line with these definitions or descriptions of the event or the stimulus. For example, the following scale may be used in obtaining ratings of the affective values of colours:

1. Most pleasant imaginable
2. Most pleasant
3. Extremely pleasant
4. Moderately pleasant
5. Mildly pleasant
6. Indifferent
7. Mildly unpleasant
8. Moderately unpleasant
9. Extremely unpleasant

10. Most unpleasant
11. Most unpleasant imaginable

The use of negative numbers is not favoured as those observers or raters who are not well versed in Algebra find it difficult to manage negative members.

Numerical rating scales are the easiest to be constructed. They are also the simplest in terms of handling the results. However, numerical scales have the limitations of biases.

Graphic scales

The graphic scale is the most popular and the most widely used type of rating scale. In this scale a straight line is shown, vertically or horizontally, with various clues to help the rater. The line is either segmented into units or continuous. If the line is segmented, the number of segments can be varied from case to case. Given below is an example of such a scale.

How effective was the tutor in the Counselling session?

Very Effective	Slightly Effective	Average	Slightly Ineffective	Very Ineffective
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There are many advantages in graphic scales. They are simple and easy to administer. Such scales are interesting to the rater and require little added motivation. However, scoring in the case of some formats of graphic scale is rather laborious.

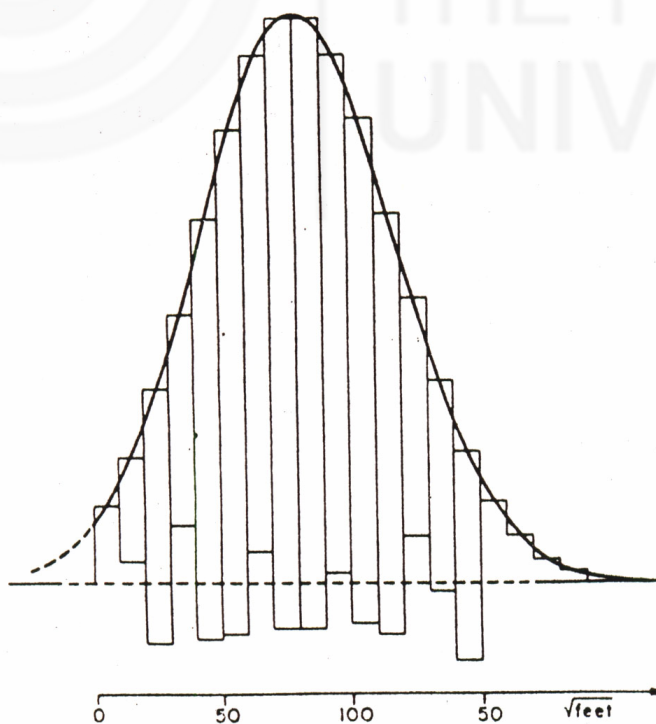


Fig. 3: Graphic Representation

Standard scales

In standard scales a set of standards is presented to the rater. The standards are usually objects of the same kind to be rated with pre-established scale values. This type is like that of the scales for judging the quality of handwriting. The scales of handwriting provide several standard specimens that have previously been spread over on a common scale by some standardised procedure like equal-appearing intervals. With the help of these standard specimens, a new sample of handwriting can be equated to one of the standards, judged as being between two standards. The 'man-to-man scale' and the 'portrait-matching' scale are the other two forms that conform more or less to the principles of standard scales.

Rating by cumulated points

The unique and distinctive feature of rating by cumulative points is its immense use and ease of scoring. The rating score for an attribute, object or individual is the sum or average of the weighted or unweighted points. The 'check-list method' and the 'guess-who technique' belong to this category of rating. 'Check list methods' are applicable in the evaluation of the performance of personnel in a job. The weights of 1 and -1 are assigned to every favourable and unfavourable trait, characteristic or attribute and the individual's score is the algebraic sum of the weights. In 'guess-who technique', some statements like "here is the one who is always doing the wrong things to make others sad", are constructed and each individual is asked to list all the members of his/her group who fitted such description, mentioning the same individual as many times as necessary. Each individual scores a point for each favourable or unfavourable description applied to him/her, and the total score is the sum total of all such points.

Forced choice ratings

In 'forced-choice rating' methods, the rater is asked, not to say whether the ratee has a certain trait or how much of it the ratee has, but to essentially say whether he/she has some or one trait or another of a pair. For example instead of deciding whether an individuals' leadership qualities are superior or above average, it may be asked if the person.

- exerts strong influence on his/her associates,
- is able to make others act, and
- asserts during functions.

Uses of rating scales

- i) Rating methods consume much less time than other methods of scaling like 'pair comparison' and 'rank ordering'.
- ii) Rating methods are quite interesting to the raters, especially if graphic methods are used.
- iii) Best ratings can be obtained by presenting one stimulus to a rater at a time.
- iv) Rating scales can be used with large numbers of stimuli to a rater at a time.
- v) Rating scales can be used with raters who have very little training for the purpose.

- vi) Rating methods can be used with large numbers of stimuli.
- vii) Rating scales have much wider range of application and can be used for tutor-ratings, personality ratings, school appraisal, sociological surveys, etc.

Limitations of rating scales

Rating scales have several limitations. Some of them are discussed as under:

- i) **Error of leniency:** There is a constant tendency among the raters to rate those whom they know well, higher than they should. Such raters are called 'easy raters'. Some raters become aware of their easy rating and consequently rate individuals lower than they should. Such raters are called 'hard raters'. The leniency error refers to a general and consistent tendency for a rater to rate too high or too low for whatever reasons.
- ii) **Error of central tendency:** Most of the raters hesitate to rate the individuals on the extremes of the scales, instead they tend to rate the individuals on the middle of the scale. Obviously, the results get distorted.
- iii) **Halo-effect:** Halo-effect is an error which obscures the clusters of traits within an individual. The rater forms a general opinion about the person's merit and his/her ratings on specific traits are greatly influenced by this general impression. It results in a spurious positive correlation among the traits which are rated. If a learner likes a tutor, he/she will rate the tutor high on all traits without considering the meaning attached to a particular trait.
- iv) **The logical error:** The logical error is due to the fact that judges are likely to give similar ratings for traits which they feel are logically related to each other.
- v) **The contrast error:** The contrast error is due to a tendency of a rater to rate others in the opposite direction (contrasting) from himself/herself in a trait.
- vi) **The proximity error:** It has been seen that adjacent traits on a rating scale tend to inter-correlate higher than the remote ones, their degree of actual similarity being approximately equal. This error may be counteracted to some extent by placing similar traits farther apart and the dissimilar ones closer.

Check Your Progress 3

List the types of rating scale.

Notes: (a) Answer in the space given below.

(b) Compare your answer with the one given at the end of this Unit.

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2.4.3 Attitude Scale

‘Attitude’ is defined as the degree of positive or negative effect associated with a certain psychological entity. In other words it is the pre-disposition of an individual towards a psychological entity - maybe an institution, ideal, symbol, phrase, slogan, job or idea towards which people respond positively or negatively. The inquiry form that attempts to assess the attitude or belief of an individual is known as an opinionnaire or attitude scale depending on the way the questions are put and responses sought.

Types of attitude scales

Various scaling techniques have led to the development of different types of attitude scales which provide quick and convenient measure of attitudes. However, the method of ‘equal-appearing intervals’ (**Thurstone Scales**) and ‘method of summated ratings’ (**Likert Scales**) have been extensively used in attitude or opinion research. The attitude scales that are developed using these scaling techniques consist of a number of carefully edited and selected items called ‘statements’.



Fig. 4: Is it the age to play

The method of 'equal-appearing intervals' was originally developed by Thurstone and Chave (1929). The attitude score of an individual obtained by this method has an absolute interpretation in terms of the psychological continuum of scale value of the statements making up the scale. If this score falls in the middle range of the psychological continuum, the attitude of the individual is described as "neutral". If it falls towards the favourable end of the continuum, it is described as "favourable" and if it falls towards the unfavourable end, it is described as "unfavourable".

In the 'method of summated ratings' developed by Likert, the item score is obtained by assigning arbitrary weights of 5, 4, 3, 2, and 1 for strongly agree (SA), agree (A), undecided (U), disagree (D), and strongly disagree (SD) respectively, for the statements favoring a point of view. On the other hand, the scoring weights of 1, 2, 3, 4, and 5 are given for the respective responses for statements opposing this point of view. An individual's score on a particular attitude scale is the sum of his/her rating on all the items.

Uses of attitude scales

- i. Attitude scales are used to measure the degree of positive or negative feeling associated with any slogan, person, institution, religion, political party, etc.
- ii. Attitude scales are used in public-opinion-surveys in order to make some important and crucial decisions. Industrial, political, educational and other leaders seek knowledge of public opinions and attitudes. Educationists, for example, conduct opinion surveys to find out how people feel about educational issues. Business firms make public opinion surveys to find out what type of product, packaging or advertising appeals to the purchasers. Politicians conduct opinion surveys to predict how people will vote or what programmes they are likely to favour.

Limitations of attitude scales

The process of assessing attitude with the help of attitude scales has various limitations.

- i. An individual may conceal his/her real attitude, and express socially acceptable opinions only.
- ii. An individual may not really know how he/she feels about social issues and he/she may never have given the idea a serious consideration.
- iii. An individual may not be able to express his/her attitude towards an abstract situation unless he/she actually confronts with it in his/her real life.

Check Your Progress 4

Describe briefly the uses and limitations of attitude scales.

Notes: (a) Write your answer in the space given below..

(b) Compare your answer with the one given at the end of this Unit.

2.4.4 Tests

A test, in the narrowest sense, connotes the presentation of a standard set of questions to be answered. We obtain a measure (a numerical value) of a characteristic or attribute of a person pertaining to his/her potential knowledge of, say, mathematics, honesty, perseverance, creativity from his/her answers to such a series of questions.

Types of tests

Tests may be classified in different ways, some of which are described as follows:

A. On the basis of administration: We have three categories under this classification:

- i) *Power vs. Speed Tests:* A 'power test' is a test in which every subject

has a chance to attempt each item of the test. It has no time limit and the subject goes on attempting test items till he/she can no longer continue successfully. On the other hand, a 'speed test' is defined as one in which no subject has enough time to attempt all items. Most entrance tests held for admission into various university courses are speed tests. A large number of items are given to be attempted within a fixed time.

- ii) *Individual vs. Group Tests*: The tests which are administered on one individual at a time are known as 'individual tests'. These tests are useful in situations where a precise and detailed assessment of some characteristics of an individual is desired.

The test which is administered to many subjects at the same time is termed as a 'group test'. These tests are particularly useful when large numbers of subjects have to be tested at the same time.

- iii) *Paper-pencil and Performance Tests*: 'Paper-pencil tests' require the subject to respond to the item by writing his/her replies. They pose questions in the form of sentences, or designs, and require the subject to record his/her answer either by underlining, ticking or encircling one of the alternative answers or by writing a word, phrase or sentence in the blank space provided for this purpose.

On the other hand, in 'performance tests', problems are presented in a concrete form and the subject is required to respond not by writing but by manipulating toys, blocks or picture cards, etc., depending on the level of the test taker.



Fig. 5: Testing the Power of a Drug

B. *On the basis of standardisation:* On the basis of standardisation tests can be classified into two categories:

- i) Non-standardised teacher-made tests and
- ii) Standardised tests.

Teachers use their own tests in classroom situations to assess the achievement of learners in different subjects/disciplines. Such tests are designed for specific use and their reliability or validity are not established by careful statistical controls. By contrast, in standardised tests each item and total score are carefully analysed. The content, administration and scoring in these tests are standardised.

C. *On the basis of traits and abilities to be measured:* Tests can also be classified in terms of their purpose, that is, the types of abilities and psychological traits they describe and claim to measure. By this standard, we may distinguish five major classes of tests, each with many sub-classes:

- i) the tests of general mental ability or intelligence,
- ii) the tests of special abilities or aptitudes,
- iii) the tests of creativity,
- iv) the tests of attainment, and
- v) the personality measure.

i) Tests of general mental ability or intelligence

Tests of general mental ability measure general ability which enters into performance of all activities and which differs in magnitude from individual to individual. The items in such tests assess the subjects' ability to perceive relationships, solve problems and apply knowledge in a variety of ways. Intelligence tests are classified as verbal and non-verbal tests, paper-pencil and performance tests, speed and power tests and individual and group tests.

ii) Tests of special abilities or aptitudes

Although intelligence tests seek to measure abilities which are valuable in almost any type of mental applications, effective educational/vocational guidance and proper placement call for tests directed at specialised abilities. Such types of test are called tests of special abilities or aptitudes. These tests are used mainly to predict success in some occupation, academic or training course. For example, for selecting clerks for a bank, Clerical aptitude tests have to be administered. Similarly for admitting learners to a B. Ed course, teaching aptitude test has to be administered.

iii) Tests of creative thinking

There are two distinct types of thinking ability, namely, convergent thinking and divergent thinking. Convergent thinking involves the generation of ideas and facts from available information and in tests of convergent thinking (tests of general intelligence and aptitude),

the subject is asked to define a word, solve an arithmetical problem, find the next number to continue a series, etc. Divergent thinking involves generation of novel responses to situations; responses that are original, unusual and varied. This thinking generally goes by the name 'creativity' and tests which are used to measure it are called tests of creative thinking or creativity. In such tests, the subject is encouraged to generate multiple responses to a problem. The responses are evaluated in terms of fluency (number of responses), flexibility (number of different categories of responses), and originality (number of responses given). For example, the respondents may be asked to name objects that are round in shape. Large and varied responses are expected to this question. Such items are included in a creativity test.

iv) Tests of attainment or achievement

Tests which are conducted to measure present performance vis-à-vis the skill or knowledge that has been acquired as a result of training are called attainment or achievement tests. They are designed to measure an individual's level of learning in a particular discipline, subject or course at the end of instruction. If an achievement test is developed to assess whether a student possesses required skills in terms of a specified criterion at a particular time, the test is designated as 'criterion-referenced or mastery test'. If, on the other hand, the test is to assess the student's relative position in a group, the test is called 'discriminatory or norm-referenced test'.

Achievement tests may be classified as traditional or essay-type, and new-type or objective tests. New type or objective tests include multiple-choice, true-false, completion, matching and short answer items.

v) Personality measures

Personality measures are obtained by either projective or non-projective techniques.

Projective techniques are used to make an assessment of various aspects of personality which cannot be measured easily by any other means.

The non-projective techniques of personality measurement include personality inventories, interest inventories, value inventories, etc. An inventory is constructed in the form of a questionnaire. It consists of a series of questions or statements to which subjects respond by answering 'yes' or 'no', 'agree' or 'disagree' to indicate preferences that describe their typical behaviour(s).

Uses of tests

The major role of educational institutions is to facilitate certain types of student learning. The tutor should encourage those activities that promote desirable student learning and discourage those that do not. Tests help in identifying such types of activities.

- i) They help in (a) providing knowledge concerning the learners entry behavior, (b) setting, refining, and clarifying realistic goals for each learner, (c) evaluating the

degree to which the objectives have been achieved and (d) determining, evaluating, and refining the instructional techniques. There are many ways through which we can obtain information about entry behavior of the learners. Aptitude and intelligence tests provide information about the entry behavior of learners. Aptitude and intelligence tests provide information concerning the speed and the ease with which a learner can be expected to learn. Achievement tests provide information as to whether a learner is weak or strong in a particular discipline/subject. For more information regarding deficiencies, diagnostic tests are used.

- ii) Tests serve various purposes in the process of counselling and guidance. Sometimes test results are used to confirm a learners ideas about his/her skills, abilities or personality characteristics. Tests may also be used to provide an estimate of the learners probable success in a particular educational or vocational field.
- iii) Many uses of psychological tests in business and industry pertain to decisions about the personnel. For example, tests may be used for selecting candidates among applicants, for placement of workers on jobs, and for determining whether a worker is suitable for promotion. Tests may be used in either of the two ways: (i) to measure an individual's abilities and characteristics in order to predict his/her performance on the new job, or (ii) as proficiency measures to establish whether the individual possesses the knowledge and skills outlined in the job specifications. Such tests are also used in training programmes, both as criterion measures and as learning experience. Besides, they may be used to study the nature of jobs, to determine the abilities and characteristics that suit workers on various jobs and how these characteristics influence the different ways the job is performed.
- iv) Tests play an important role in research specially in areas like educational psychology. For example, in validation studies, tests are used to predict, and to measure a variable or construct. Other researcher may investigate the relationship between performance in various tests in order to learn more about the structure of abilities of personality organisation.

Limitations of tests

- i) Tests of intelligence or special aptitude should not be considered as the absolute measures of pure intelligence or creative thinking because the performance in such tests is partly determined by one's background and schooling.
- ii) Inventories used for personality assessment have low predictive validity especially when the subjects tested are below seventeen years of age.
- iii) Tests measuring cognitive processes can hardly measure higher mental processes such as ability to discover scientific laws and principles.
- iv) The strength and depth of understanding of an individual and appreciative reactions in ethical, social, or aesthetic fields are hardly measured by tests.

2.5 LET US SUM UP

In this Unit, we have described the characteristics of a good research tool, various types of research tools and their uses and limitations.

- A good research tool should be valid, reliable and usable.
- Validity pertains to the truthfulness of a research tool; reliability is the consistency of the results when a research tool is repeatedly administered on the same individual under similar conditions; and usability relates to the objectivity, economy of time and cost, ease of administration and analysis of results, etc.
- Content validity, criterion-related validity and construct validity are the three main types of validity.
- Generally, in assessing reliability of a research tool, we usually make use of test-retest, parallel-form, split-half or rational equivalence method.
- Questionnaires, interviews, rating scales, attitude scales, and tests, are the main data-gathering research tools or techniques.
- Questionnaires consist of a series of questions dealing with psychological, social, educational and other related issues.
- Questionnaires are either structured or unstructured. A good questionnaire is specific in purpose, simple in language, logical in arrangement of questions and moderate in length. It is administered personally or mailed to individuals.
- Rating scales are used to obtain judgement on a set of points which describe varying degrees of an attribute under observation.
- Numerical scales, graphic scales, rating by cumulative points and forced choice ratings are the commonly used rating techniques.
- Leniency error, central tendency error, halo-effect, logical error, contrast error and proximity error are the major error types in using rating scales.
- Attitude scales are used to assess the attitude of an individual towards another individual, slogan, religion, institution, a different mode of teaching etc. They are mostly used in opinion surveys. Thurstone's method of 'equal appearing intervals' and Likert's method of 'summated ratings' are extensively used in the construction of attitude scales.
- A test is a standard set of questions which is used to obtain a measure (a numerical value) of an attribute or a characteristic of a person pertaining to his/her academic achievement, interests, values, personality trait, intelligence, etc. Tests are useful for teachers in taking instructional decisions concerning entry behaviour of learners, instructional strategies and terminal behaviour of learners; for counsellors and guidance workers in educational and vocational guidance of students; and for industry and administration in effecting selection, classification and placement of personnel.

2.6 GLOSSARY

1. **Tool:** An instrument used for gathering data or information pertaining to certain attributes or characteristics of an individual or a group; issues relating to society, systems etc.
2. **Validity:** The extent to which a tool does the job for which it used. This term has different connotations for various types of tools and, thus, a different type of validity evidence is appropriate for each.
 - (i) Content validity: It relates to the relevance of a content of a research tool pertaining to the objectives and nature of a research problem.
 - (ii) Criterion-related validity: The extent to which measures or scores on the tool are in agreement with (concurrent validity) or predict (predictive validity) some given criterion measure.
 - (iii) Construct validity: The extent to which a test measures relatively abstract psychological traits or constructs.
3. **Reliability:** The extent to which a tool is consistent in measuring whatever it may measure.
4. **Usability:** The extent to which a tool is objective, easy to administer and cost effective.
5. **Questionnaire:** Printed form containing a set of questions of open and closed types with spaces for filling in responses by the respondent.
6. **Structured Questionnaire:** A questionnaire in which questions are framed with a view to limiting the variety of responses made by the respondent.
7. **Unstructured Questionnaire:** A questionnaire in which the questions are left open with a view to providing freedom to respondents for giving responses.
8. **Rating:** A term applied to an expression of opinion or judgement regarding some situation, object or character.
9. **Rating Scale:** A scale with a set of points which describe varying degrees of the dimension of an attribute under observation.
10. **Attitude:** The degree of positive or negative affect associated with some psychological object. By psychological object we mean any institution, ideal, symbol, phrase, slogan, job or idea towards which people can differ in their opinion.
11. **Attitude Scale:** A device which provides a measure of attitudes. It consists of a series of short but carefully formulated statements or propositions dealing with several selected aspects or many appropriate aspects of issues, institutions or groups of people under study.
12. **Tests:** (i) Any tool by which the presence, quality or genuineness of anything is determined; (ii) A device to evaluate the performance and capabilities of a learner or class (for example, knowledge of a subject); (iii) A procedure for eliciting responses upon which appraisal of the individual can be based (for example, intelligence, creativity etc.)

2.7 CHECK YOUR PROGRESS: THE KEY

1. *Validity* in the case of a research tool is its relevance to the objectives and nature of a research problem.

Reliability is the consistency of a research tool in measuring whatever it measures.

Usability is the extent to which a tool is objective, easy to administer and cost effective.

2. A good questionnaire must

- indicate its objectives through the questions,
- use a direct, concise and simple language,
- include a series of 'why', 'what', 'when' and 'how' questions,
- place questions in a logical order, and
- include a relatively small number of questions and demand several forms of responses.

3. Rating scales are broadly classified into five types;

- i) numerical scales,
- ii) graphic scales,
- iii) standard scales,
- iv) rating by cumulative points, and
- v) forced choice ratings

4. Attitude scales:

Uses

- The degree of positive or negative feelings associated with a slogan, person, institution, etc. be measured easily using such scales.
- They help in taking informal decisions related to industrial, political and/or educational matters effecting public opinion.

Limitations

An individual may conceal the real attitudes.

Reference

Thurstone, L. and Chave, E., (1929), *The Measurement of Attitude*, Chicago: University of Chicago Press.

UNIT 3 INTERVIEW, OBSERVATION, AND DOCUMENTS AS TOOLS

Structure

- 3.0 Introduction
- 3.1 Objectives
- 3.2 Types of Tools and their Uses
 - 3.2.1 Interview
 - 3.2.2 Observation
 - 3.2.3 Documents
- 3.3 Let Us Sum Up
- 3.4 Glossary
- 3.5 Check Your Progress: The Key

3.0 INTRODUCTION

In Unit 2 you studied the characteristics of a good research tool. You also read about the four important tools of data collection, namely, questionnaires, attitude scales, rating scales, tests, and the techniques of collecting relevant data through these tools, and their strengths and limitations.

This Unit is a continuation of the previous one. In this Unit we shall discuss a few more tools of data collection such as, interviews, observations, documents and journals. Each of these tools and techniques has a specific role in the process of collecting data and has its own uses and limitations.

The interview schedule, for instance, is an oral questionnaire through which the researcher can explain more explicitly the purpose of the investigation. Observation is a technique used to classify and record in a planned manner the individual responses to real life situations. The documents describe the process of personal/group development or the occurrence of an event in accordance with legal or administrative regulations attached to that event. The documents and records are useful in bringing together data for scientific analysis from remote areas and time periods.

3.1 OBJECTIVES

On the completion of this Unit, you should be able to:

- Define an interview as a tool for data collection,
- Describe the various types of interviews,
- Describe the technique of interviewing,

- Describe the uses and limitations of interviews,
- Define the observation technique,
- Describe the types of observation,
- Describe the steps involved in the process of observation,
- Describe the uses and limitations of observation,
- Define documents,
- Describe types of documents,
- Describe the uses of documents, and
- Describe the uses of journals.

3.2 TYPES OF TOOLS AND THEIR USES

3.2.1 Interview

Interview is a process of communication or interaction in which the subject or interviewee gives the needed information verbally in a face-to-face situation. In a sense, it is an oral questionnaire. In a research situation it may be seen as an effective, informal, conversation, initiated for a specific purpose as it focusses on certain areas. The main objective may be the exchange of ideas and experiences and eliciting of information.

Types of interview

Interviews may be classified according to the purpose for which they are used and according to their design and structure.

For purposes of research, an interview may be used as a tool for gathering data required by the researcher to test a hypothesis or to solve his/her problems of historical, experimental, survey or clinical type of research. This type of interview is called '**research interview**'.

In many situations the objective of interview is to secure information about the individual's problems, his/her past history, job or family adjustments. In such situations, the major purposes of interviews are diagnosis and treatment. This type of interview is called a '**clinical interview**'. It is used by social workers and psychiatrists.

Interviews may vary in design and structure. In some situations, an interviewer may interview one individual at a time. It is called an '**individual interview**'. In a '**group interview**', a group of individuals is interviewed at one and the same time.

Interviews are also classified as '**structured**' and '**unstructured**'. A 'structured interview' is one in which the whole situation is carefully structured and the major areas of inquiry are mapped out. However, the interviewee is given considerable freedom to express his/her definition of the presented situation. In this type of interview, the interviewer uses a highly standardised tool and a set of pre-determined questions. 'Structured interview' is also designated as 'directive interview'.

'Unstructured interview' also termed as 'uncontrolled', 'unguided', or 'non-directive' interview is one where the interviewer does not follow a list of predetermined questions. The interviewees are encouraged to relate their concrete experiences with no or little direction from the interviewer, to dwell on whatever events seem significant to them, to provide their own definition of their social situations and reveal their opinions and views as they like. Although the series of questions to be asked and the procedure to be followed are decided before hand, the interviewer is largely free to arrange the form and timing of the questions. He/she can rephrase the questions, modify them and add new questions to his/her list.



Fig. 1: Interview

Techniques of interviewing

Although the interview as a research tool can be modified according to the needs of the research situation, there are certain techniques that need to be understood. These techniques deal with preparation for the interview, conducting the interview and recording the information gathered.

1. Preparation for the Interview

It is necessary to plan carefully for an interview. The interviewer must decide exactly what kind of data the interview should yield, whether the structured or unstructured type of interview will be more useful and how the results of interview should be recorded. It is advisable to try out the interview on some persons before using it for actual investigation. This is helpful in revealing the deficiencies or shortcomings that need to be corrected

before the interview is carried out. The interviewer must have a clear idea of the sort of information he/she needs, and may accordingly prepare a list of questions in the form of a “schedule”. Interview schedule is a device consisting of a set of questions, which are asked and filled in by an interviewer in a face-to-face situation with the interviewee. Since it is administered personally, it provides the researcher an opportunity to establish a rapport with the respondents. This helps the researcher to explain the nature and purpose of investigation and to make the meaning of the questions clear to the respondents in case they misinterpret a question or give incomplete or indefinite responses. The schedule also economises time and expenses of investigation. The procedure of constructing a schedule is same as that of a questionnaire.

2. Conduct of Interview

In the conduct of an interview, a harmonious relationship between the interviewer and interviewee is most essential. A good rapport helps the interviewee to feel at ease and express himself/herself willingly. In order to establish a good rapport, the interviewer should greet the interviewee in a friendly manner so as to get settled in a relaxed manner. As an interviewer you should observe the following rules in order to elicit effective responses:

- (i) Ask only one question at a time.
- (ii) Repeat a question if necessary.
- (iii) Try to make sure that the interviewee understands the questions.
- (iv) Listen carefully to the interviewee’s answer.
- (v) Observe the interviewee’s facial expressions, gestures, and tone or voice so as to derive meanings from his/her body language.
- (vi) Allow the interviewee sufficient time to answer the question, but do not let the interview drag on and on.
- (vii) Avoid suggesting answers to questions.
- (viii) Do not show signs of surprise, shock, anger, or other emotions if unexpected answers are given.
- (ix) Maintain a neutral attitude with respect to controversial issues during the interview.
- (x) Take note of answers that seem to be vague, ambiguous, or evasive.
- (xi) Use tact and skill in getting the subject back to an area of inquiry if he/she has strayed too far from the original question.
- (xii) In the unstructured interview, ask additional questions to follow up clues or to obtain additional information.

The interviewer should try to redirect the interview to more fruitful topics when he/she feels that the required information is not sufficient. He/she should wind up the interview before the interviewee becomes tired.

3. Recording of the Interview

The recording of the interview is obviously an essential step in interviewing. The interviewer may use a schedule, a structured format, rating scale or a tape recorder to record the responses of the interviewee. The use of a tape recorder during the conduct of the interview not only eliminates the omissions, distortions, elaborations and other

modifications of data usually found in written interview responses, but it also provides an objective basis for evaluating the adequacy of the interview data in relation to the performance of the interviewee. The use of a tape-recorder also permits the interviewer to devote full attention to the interviewee and save much of the time which he/she would otherwise use in writing down the responses during or after the interview. However, if a tape-recorder is not available, the interviewer has to take notes to record the responses.

Uses of the interview

- i. An interview provides an opportunity to the interviewer to ask questions on various areas of inquiry. It permits greater depth in responses which is not possible through any other means.
- ii. An interview is not an entirely independent tool of research for gathering information pertaining to feelings, attitudes or emotions. It is supplementary to other tools and techniques. A combination of interviewing, observations, and statistical techniques often yield the best results, but the balance of emphasis shifts with the frame of reference and objectives of the study. Since an interview is a highly flexible tool in the hands of skillful interviewers, it allows a more liberal atmosphere than in the use of other techniques of investigation. Questions not readily grasped by interviewees can be rephrased or repeated with proper emphasis and explanations when necessary.
- iii. An interview is an effective tool for a social scientist in the study of human behaviour. Through this technique, a researcher can secure very intimate and personal knowledge about the subject of his/her study, which is denied to the natural scientist, who cannot communicate with the subjects despite all the instruments of precision.

Limitations of the interview

In spite of many uses of the interview method, it is not without limitations that jeopardise its value, even when it is used as a supplementary research technique.

- i. Interview is a time consuming technique.
- ii. The effectiveness of the interview depends greatly upon the skill of the interviewer which everyone do not ordinarily possess. It takes time to master this skill.
- iii. There is a constant danger of subjectivity on the part of the interviewer.
- iv. An interview is very difficult to employ successfully because even in the presence of a skilled interviewer some interviewees do not respond freely, frankly and accurately.
- v. Since memory and retention are highly selective processes, interviewees generally provide accurate and vivid accounts of the most recent or intense experiences, or of situations that they encounter most frequently. Painful or embarrassing experiences are forgotten or consciously avoided by the interviewees. In such cases the responses lack accuracy.

Check Your Progress 1

In what respects is an interview less useful than a questionnaire? Answer briefly in about 50 words.

Notes: (a) Give your answer in the space provided below.

(b) Compare your answer with the one given at the end of this Unit.

3.2.2 Observation

Observation may be defined as a process in which one or more persons observe some real-life situation and record pertinent occurrences. It is used to evaluate the overt behaviour of the individuals in controlled and uncontrolled situations.

Types of observation

Observations may be classified into two types:

- a) **Participant observation**
- b) **Non-participant observation**

Participant observation: In the process of 'participant observation' the observer becomes more or less one of the group members and may actually participate in some activity or the other of the group. The observer may play any one of the several roles in observation, with

varying degrees of participation, as a visitor, an attentive listener, an eager learner, or as a participant observer.

Non-participant observation: In the process of 'non-participant observation', the observer takes a position where his/her presence is not felt by the group. He/she may follow closely the behaviour of an individual or characteristics of one or more groups. In this type of observation, a one-way 'vision screen' permits the observer to see the subject but prevents the subject from seeing the observer.



Fig. 2: Observation

Observations may also be classified into the following two categories:

- i) **Structured observation** and
- ii) **Unstructured observation.**

Structured observation: Structured observation is formal in character and is designed to provide systematic description to test casual hypotheses. It is executed in controlled situations like classrooms or laboratory settings. This type of observation starts with relatively specific formulations. There is not much choice with respect to the content of observation. The observer sets up in advance the categories of behaviour in terms of which he/she wishes to analyse the problem, and keeps in mind the time limit within which he/she has to make the observation.

Unstructured observation: Unstructured observation is associated with participant observation and is often an exploratory exercise. In unstructured observation, it may not be possible to categorise behaviour before the observation. The observer considers aspects of behaviour in terms of their contexts or situations of which they are a part.

Stages in the process of observation

As a good research technique, observation needs proper planning, expert execution, and adequate recording and interpretation.

i) Planning for observation

Planning for observation includes definition of specific activities or units of behaviour to be observed; the nature of the groups of subjects to be observed; the scope of observation—individual or group; determination of the length of each observation period; and deciding about the tools to be used in making the observation and recording.

ii) Execution of observation

The expert execution of observation includes:

- a) proper arrangement of specific conditions for the subject or subjects to be observed,
- b) assuming proper role or physical positions for observing,
- c) focussing attention on the specific activities or units of behaviour under observation,
- d) proper handling of recording instruments to be used, and
- e) utilizing one's training and experience fairly effectively in terms of making the observation and recording the facts.

iii) Recording and interpreting the observation

Recording of the observation data should take place either simultaneously or soon after the observation. In the former case, the observer goes on recording his/her observation data simultaneously with the occurrence of the phenomenon observed. In the latter case, the observer undertakes to record his/her observations not simultaneously with the actual event, but immediately after he/she has observed for a certain period of time while the details are still fresh in his/her mind. In viewing, classifying and recording behaviour, the observer must take utmost care to minimize the influence of his/her biases, attitudes and values on the observation report. The observer should know what he/she is looking for in a given situation and should carefully and objectively record the relevant data.

Subjectivity on the part of an observer may partly be due to his/her emotional involvement, his/her selective perceptions and memory. In order to overcome these biases, various mechanical instruments are used to obtain a more accurate records of events. The use of cameras, tape-recorders, stop-watches, binoculars, audiometer, one-way vision screens, mirrors, etc., allows behaviour to be measured to a degree of accuracy which cannot be achieved by the unaided human observer. It is worthwhile to develop an "observation schedule" like a question schedule for making and recording observations. The specific behaviours to be observed and recorded should be listed in this schedule.

Uses and limitations of observation

Uses

- i. Observation provides a direct method for studying various aspects of human behaviour. Indeed, it may be the only effective way to gather data in a particular situation e.g., behaviours of a counsellors in actual counselling sessions.

Tools for Research

- ii. Observation enables the researcher to record behaviour at the time of occurrence.

Limitations

- i. A subject may intentionally attempt to exhibit artificial behaviour when he/she knows that he/she is being observed.
- ii. It is time consuming and costly.

Check Your Progress 2

List the various types of observation and the steps involved in them.

Notes: (a) Answer in the space given below.

(b) Compare your answer with the one given at the end of this Unit.

3.2.3 Documents

Documents are records which normally come to the researcher 'ready-made'. They may describe a process of personal/group development, or the occurrence of an event in accordance with legal or administrative regulations attached to that event. Some other person, either a participant in a social situation or process, or the originator of a system of recording, has already determined the form/type of data. These data are reviewed in terms of the research problem before they are actually used by the researcher. Since the data comes ready-made as the content of the document, they do not depend on a specific investigator or research team's accessibility to the field. The data obtained through observation, tests and questionnaires, and interviews are gathered for a specific purpose and are only drawn from universes in space and time where researchers are sent by the formulators of that design. Documents, on the other hand, bring together data of remote periods and places for scientific analysis.

Types of Documents

Documents may be classified into three categories on a continuum. At one end of the continuum are the 'expressive documents' specifying the process of social interaction and at the other end are those like court records, official histories, and proceedings of

commissions. In between are newspaper stories, recountings, etc. which rarely yield sufficient details of the interactive process. Another important type of document is journals. In this section, we will discuss different types of documents.

(i) Expressive Documents

Expressive documents include the following categories:

(a) personal letters; (b) life or case histories in the form of diaries, biographies and autobiographies; and (c) accounts of small-group processes.

Personal Letters

Personal letters constitute the most frequently available type of expressive documents. The value of letters as expressive documents varies with the cultural background of the writers. Nonetheless, the writer communicates freely and fully his/her views and emotions in personal letters.

Life Histories/Case Histories

Life or case histories in the form of diaries, biographies and autobiographies have been used extensively by historians. They have been identified as the “personal documents par excellence” by psychologists. However, they have not been used much in social or psychological research.



Fig. 3: Searching for the Documents

Accounts of Small-group Processes

Accounts of small-group processes are a third category of expressive documents. Since such accounts are so hardly written spontaneously, they are not of much use in any large investigation.

The data obtained from expressive documents are recorded with the help of ‘document schedules’. In order to secure measurable data, the items included in this type of schedule are limited to those that can be uniformly secured from a large number of case histories and other records. For example, for a study of the records of drop-outs among the distance learners enrolled with a particular study centre of IGNOU items such as the age, the study centre, financial position of the family, academic performance during the period of enrollment are necessary. A scrutiny of a large number of records vis-a-vis the above items shall yield sizeable results and an adequate number of records can be ascertained.

Uses of Expressive Documents

- i. In certain socio-psychological cases, where the researcher needs to understand the “definition of the situation” of a particular group of participants, expressive documents constitute an invaluable source of scientific information.
- ii. Expressive documents are useful in giving the researchers a “feel” for the data and thus produce “hunches” with respect to the most fruitful way of conceptualising a problem.
- iii. Expressive documents are useful in not only identifying the significant variables of a problem but also in suggesting the hypotheses embodying these variables and the verification of the hypotheses.

(ii) Official Records

Official records provide useful information about the time and occurrence of an event in accordance with legal administrative regulations attached to that event. Such data cover a very wide range comprising extensive records of events, namely, births, deaths, marriages, divorces, institutional attendance (school, college, distance education centre etc.), performance in psychological and educational test, crimes, court actions, prison records, registration, voting, social security payments and benefits, illness/hospital data, production/business records, memberships, census data etc. Official records include legislative, judicial, and executive documents prepared by central or state governments, municipalities, panchayats or other local bodies, such as laws, charters, court proceedings and decisions, the data preserved by missionaries and other religious organisations such as financial records and records of the minutes of the meetings of governing bodies; the information compiled by central or state educational departments, special commissions, professional organisations, school boards, universities, administrative authorities, reports of committees and commissions, administrative orders, educational surveys, annual reports, budget, pictorial records viz. photographs, movies, micro-films, drawings, paintings, coins and sculptures, remains or relics and the like.

The official records are useful in knowing and understanding past events and trends so as to gain perspective on the present and the future. They aim at determining and presenting truthfully the important facts about life, character and achievements of great personalities. Records are helpful in studying the legal basis of educational institutions, status of tutors, and finances, in understanding the history of ideas, major philosophies and scientific thoughts.

Check Your Progress 3

List the various types of documents.

Notes: (a) Give your answer in the space provided below.

(b) Compare your answer with the one given at the end of this Unit.

(iii) Journals

Information about new ideas and developments often appear in journals long before they appear in books. There are many journals currently being published covering education and distance education/open learning. In fact, they are the best sources for reports on recent researches in the area of open-learning. Journals provide updated treatment to current questions and issues in distance education. They also publish articles of local interest that never appear in the book form. Journals are the best sources for determining contemporary opinion and status, present or past.



Fig. 4: Consulting Journals

All those engaged in research in the area of distance/open learning should become acquainted with research and professional journals in distance education and they should also learn to use the indexes to these journals. Knowledge about the editor of a periodical, the names of its contributors, and the associations or institutions publishing it serve as clues in judging the merit of the journal. Abstracts are also available which include brief summaries of the contents of the articles. They serve as one of the most useful reference guides to the researcher and keep him/her abreast of the work that is being done in his/her own field and other related fields.

Check Your Progress 4

List the uses of journals.

Notes: (a) Give your answer in the space provided below.

(b) Compare your answer with the one given at the end of this Unit.

3.3 LET US SUM UP

In this Unit, we have discussed interviews, observations and documents as tools of research.

- An interview is a process of interaction in which the subject (interviewee) provides the needed information verbally in a face-to-face situation. Preparation, conduct and recording are the main steps in an interview. It may be structured or unstructured. A structured interview is one in which the whole situation is carefully structured. It is also designated as directive interview. In an unstructured interview also designated as “non-directive interview”, the interviewer does not follow a system or a list of predetermined questions.
- Observation refers to a technique in which one or more persons observe what is occurring in some real-life situations. It is used to evaluate the overt behaviour of individuals in controlled and uncontrolled situations. As a good research tool, observations need proper planning, expert execution and adequate recording.
- Observations may be either participant or non-participant, structured or unstructured.
- Documents are records which provide ready-made content from remote periods and places to the researcher for scientific analysis. They may be classified into three categories on a continuum. At one end of the continuum are “expressive documents” specifying the process of social interactions and at other end its are such documents (official records) as court records, official histories, etc. In between are such types as newspaper stories, etc., which rarely yield sufficiently detailed statements about the interactive processes.
- Journals provide information about new ideas and developments much before they appear in books. They publish articles of temporary, local and limited interests that never appear in the book form.

3.4 GLOSSARY

- | | |
|-----------------------------------|--|
| 1. Interview: | A technique for assessing ability, personality etc. in a face-to-face discussion between the interviewer and the interviewee. |
| 2. Structured Interview: | An interview in which questions are framed with a view to limiting the variety of responses made by the subject (interviewee). |
| 3. Unstructured Interview: | An interview in which the interviewer does not follow a system or list of predetermined questions. |
| 4. Observation: | A technique for studying overt behaviour by watching activities of individuals in different social settings by talking to them, or by studying their constructive or creative products, etc. |

- 5. Structured Observation:** Studying of individuals in controlled situations.
- 6. Documents:** Records which provide ready-made content of remote times and places.

3.5 CHECK YOUR PROGRESS: THE KEY

1. As compared to a Questionnaire, an Interview has the following limitations:
 - It is time consuming.
 - It requires effective communication skills on the part of the interviewer.
 - The interviewer may often be subjective.
 - It is not always possible to extract free, frank and accurate information from the interviewees.
2. Observation Types
 - (i) Participant observation
 - (ii) Non-participant observation (structured and unstructured) Steps in the process of observation:
 - (i) Planning; (ii) Executing; (iii) Recording
3. Types of Documents
 - (i) Expressive Documents: (a) Personal letters; (b) Life or case histories; and (b) Accounts of Small Group Processes.
 - (ii) Official Records
 - (iii) Newspaper Stories/Memories.
 - (iv) Journals
4. Uses of Journals
 1. Journal provide information about new ideas and developments long before they appear in books.
 2. Journals publish articles of temporary, local or limited interest that never appear in the book form.

UNIT 4 DATA COLLECTION

Structure

- 4.0 Introduction
- 4.1 Objectives
- 4.2 The Concept of Data
- 4.3 Methods of Data Collection
 - 4.3.1 Asking Questions
 - 4.3.2 Observation of Behaviour
 - 4.3.3 Utilisation of Existing Records or Data
- 4.4 Ensuring the Quality of Data
- 4.5 Key Points at a Glance
- 4.6 Let Us Sum Up
- 4.7 Glossary
- 4.8 Check Your Progress: The Key

4.0 INTRODUCTION

To carry out a research study, you have to collect the relevant information or data so that the hypotheses or generalisations you hold tentatively can be verified. This involves selection of samples from the population concerned. You also have to devise appropriate tools and use suitable techniques for measuring relevant attributes of selected samples. In units I, II and III, we discussed the concepts of population and sample, various sampling techniques along with the different data gathering tools and techniques varying in their complexity, design and ways of administration. Each tool or technique is appropriate for collecting a particular type of data or information which lends itself to a particular type of analysis and interpretation for drawing meaningful conclusions and generalisations. In this unit we shall focus on various methods used for collecting data and ensuring their quality.

4.1 OBJECTIVES

On the completion of this Unit, you should be able to:

- Define data and its various types,
- Describe the methods of collecting data, and
- Suggest precautions which are needed to ensure the quality of data.

4.2 CONCEPT OF DATA

The information collected from various sources through the use of different tools and techniques generally comprise numerical figures, ratings, descriptive narrations, responses to open-ended questions, quotations, field notes, etc. This information is called **data**. In educational research, usually two types of data are used universally. They are, **Quantitative data** and **Qualitative data**.

1. Quantitative Data

Quantitative data are obtained by applying various scales of measurement. The experiences of people are fit into standard responses to which numerical values are attached. These data are close-ended and hardly provide any depth or details. Quantitative data are either parametric or non-parametric. Parametric data undergo interval or ratio scale measurement. For example, in measuring reaction time, we make use of ratio scale measurement. The score on a psychological test or inventory is an illustration of interval scale measurement. Non-parametric data are obtained by applying nominal or ordinal scales of measurement. These data are either counted or ranked.

2. Qualitative Data

Qualitative data are verbal or symbolic. The detailed descriptions of observed behaviours, people, situations and events, are some examples of qualitative data. For example, the responses to open ended questions of a questionnaire or a schedule, first hand information from people about their experiences, ideas, beliefs, and selected content or excerpts from documents, case histories, personal diaries and letters are other examples of qualitative data.

Check Your Progress 1

List the various types of data.

Notes: (a) Write your answer in the space given below.

(b) Compare your answer with the one given at the end of this unit.

4.3 METHODS OF DATA COLLECTION

As discussed earlier, there are mainly three methods of obtaining data in educational research: (i) one can ask questions; (ii) one can observe the behaviour of persons, groups or organisations, and their products or outcomes; or (iii) one can utilise existing records or data already gathered for purposes other than one's research. In all the three methods the researcher needs to familiarise himself/herself with the procedure he/she is to adopt for collecting data from sample groups or records.

4.3.1 Asking Questions

In the first method, the researcher may use psychological tests, inventories, questionnaires, or schedules. In Unit II you have learnt that tests are useful tools of educational research. They are devised to evaluate and measure behaviour in a standardized way for the purpose of providing data for most experimental and descriptive studies in education. Tests and inventories yield objective and standardized descriptions of behaviour, quantified in numerical scores. Under ideal situations, intelligence, aptitude or achievement tests measure the best performance of which individuals are capable. The inventories attempt to measure typical behaviour. In experimental studies, a researcher may use test scores to equate the experimental and control groups, to describe relative skill at this task prior to the application of the teaching methods, to assess gains in achievement resulting from the application of the experimental and control teaching methods, and to evaluate the relative effectiveness of teaching methods. Tests and inventories are frequently used to describe prevailing conditions at a particular time in descriptive research studies. For example, achievement tests are used extensively in school surveys in the appraisal of instruction.

In selecting tests or inventories for collecting data in research situations, a researcher must evaluate their validity, reliability and usability. The researcher should carefully examine the standardized data of the tests/inventories contained in the manuals and extensive analysis of published evaluations of the instruments. It makes the researcher aware about their usefulness and limitations in different test situations.

Ease of administration, scoring, and interpretation are important factors in selecting a test or inventory. The tests or inventories which are easily and effectively administered, scored, and interpreted should generally be used.

The procedure given in the manual for administering a test or an inventory should be strictly followed to collect dependable data. The cooperation of the subjects must be ensured at each stage of data collection. The subjects should be encouraged to provide objective information. The responses of the subjects should be independent of the personal judgement/view of the researcher who is using the test or inventory. The testing conditions should be made interesting and fascinating so as to gain the cooperation of the subjects. Questionnaires and interview schedules are the other tools of research through which information is sought. The reliability and validity of the data gathered through questionnaires or interview schedules depends not only on their design but also on the

manner of administering the questionnaire or the technique of interviewing. The questionnaire is generally sent through mail to the subjects for answering without any further assistance from the sender (researcher). The schedule, on the other hand, is generally filled out by the researcher who can interpret the questions whenever necessary. In certain situations when the researcher administers the questionnaire personally it creates an opportunity to establish rapport with the subjects, explain them the purpose of the study, and the meaning of items that may not be clear. The availability of a number of subjects in one place helps in exercising economy of time and expense and provides a high proportion of usable responses. However, subjects who have the desired information cannot always be contacted personally without spending of a great deal of time and money in travel. It is in such situations that mailed questionnaires are useful.

The researcher should choose the respondents carefully before administering the questionnaire. It is important that questionnaires be sent only to those who possess the desired information and are interested to respond conscientiously and objectively. It is advisable to send a preliminary letter to respondents individually asking whether the individual would be willing to participate in the proposed study. This is not only a courteous approach but a practical way of identifying those who will cooperate in furnishing the desired information. The researcher should also consider the possibility of providing for anonymous responses if the desired information is delicate or confidential in nature. This approach is helpful in producing objective and honest responses.

4.3.2 Observation of Behaviour

Direct observation of the behaviour of persons, groups or organisations provides reliable and conceptually meaningful data in field studies as well as in laboratory experimentation. You have already learnt that observation is the technique in which one or more persons observe what is occurring in some real-life situation. This technique, like other research tools and techniques, needs proper planning, expert execution, and adequate recording and interpretation. Observation is always directed towards a specific goal. It is neither haphazard nor unplanned. The planning for observation includes definition of specific activities or units of behaviour to be observed, the nature of the groups of subjects to be observed, determination of the length of each observation period and decisions regarding the tools to be used in observation and recording. Effective execution of observation ensures proper arrangement of specific conditions for the subject or subjects to be observed, objective and effective use of recording tools, and interpretation of observation data.

Observation may be either participant or non-participant in structured or unstructured situations. Structured observations are executed in controlled situations like classroom or laboratory settings. Unstructured observation is mainly associated with participant observation and it is often an exploratory technique. The recording of the observation data may either be simultaneous or soon after the observation. In the former case, the observer goes on recording his/her observations along with the occurrence of the phenomena observed. In the latter case, the observer undertakes to record his/her observations not simultaneously with the actual observation process, but immediately after he/she has observed for a unit of time while the details are still fresh in the mind. As discussed earlier in Unit III, an observation schedule is developed and used for recording

and taking notes about the observed behaviours. The specific behaviours to be observed and recorded are listed in this schedule.



Fig 1: Observing Behaviour

Observation is done either directly, as when the observer plays a passive role and observes without intervening in any way; or in an interview, where the observer plays a more active role, by asking a series of questions or administering a test, and where he/she observes the behaviour of the subject (interviewee) as well as records his/her responses.

4.3.3 Utilisation of Existing Records or Data

In Unit 3, you read that when the researcher uses the method of observation, either participant or non-participant, he/she focuses on those aspects of the behaviour of an individual or individuals which are of interest to him. If he/she uses tests or questionnaires, he/she chooses or frames the tool to suit his/her research needs. He/she uses interviews if he/she needs information on matters of confidential or personal nature. In using these tools, the researcher controls or manipulates the situation according to his/her research objectives. In contrast, the existing data or records/documents bring to the researcher's notice, certain data over which he/she has relatively little control. These come to the researcher readymade. Some other person, either a participant in a social situation or process, the originator of a system of recording, or the creator of an index, has already determined the form of the data. The data obtained through observation, through tests and questionnaires, and through interviews are gathered for a specific purpose. Documents and records, on the other hand, may bring together data for scientific analysis from remote periods and places. These data provide unique access to historical and social situations and to some current social situations too, which are otherwise difficult or expensive to observe. Personal letters, life histories, diaries, autobiographies, court records, proceedings of commissions, seminars and conferences, newspaper stories, registration and census records/information pertaining to births,

deaths, marriages, divorces, school attendance, drop out rate, performance on psychological tests, crimes known to police, arrests, court actions, prison records, voting pattern in the parliament and assembly elections, automobile registrations, enrolment of distance learners in different study or regional centres etc. are examples of documents and records.

Check Your Progress 2

Describe briefly the methods of collecting data.

Notes: (a) Write your answer in the space given below.

(b) Compare your answer with the one given at the end of this unit.

4.4 ENSURING THE QUALITY OF DATA

The adequacy of a tool or technique for collecting data is ordinarily judged in terms of the criteria of reliability (consistency), validity (truthfulness) and usability which were discussed in detail in Unit 2. Reliability requires that repeated measurements yield results which are identical or fall within narrow and predictable limits of variability. The criterion of validity demands that measurement be meaningfully related to the research objectives; that is, it should measure what it purports to measure. The requirements of usability ensure objectivity in the use of a tool or technique and economy of time and cost in field situations. A good tool and its objective use in the collection of data ensures quality.

Psychological tests or inventories are likely to gain the cooperation of subjects and conserve the time of all those involved in their administration provided they are administered in a short period of time. The active co-operation of the subjects is likely to enhance the quality of the data. Hence, the researcher should take utmost care in selecting a reliable and valid test from the available standardized tests. These tests are easily and effectively administered, scored and interpreted by the researcher. They should also be interesting and enjoyable for the subjects so as to ensure objective data. Boring tests that discourage or antagonise the subjects, should not be used for collecting quality data. The testing conditions should be favourable; otherwise, the test is not likely to yield useful and quality data.

The collection of data by means of questionnaires or interview schedules is a highly complicated and technical job which demands considerable effort on the part of the researcher. Much of the quality of the data obtained depends on the skill with which the tools are administered. Now, we shall discuss some guiding principles which a researcher should consider while using questionnaires or schedules.

The researcher should choose the subjects carefully. It is important to know that only those subjects should be selected who possess the desired information and are likely to be keen to respond conscientiously and objectively. A questionnaire or a schedule, unlike a psychological test or inventory, has a very limited purpose. It is a one-time operation when the tool is administered to a limited population. Hence, the question of validity and reliability of these tools is not dealt with as seriously as in the case of psychological tests or inventories. However, the validity of the data gathered through questionnaires or schedules is improved considerably by making the language of the questions less ambiguous. The meaning of all the terms used in the questionnaire/ schedule must be clearly defined so that they carry the same meaning for all respondents. The predictive validity of some specific types of questions can also be estimated by follow-up observations of respondent behaviour. The reliability of the responses to the questions can be inferred by a second administration of the tool and comparing the responses with those of the first.



Fig. 2: Quality of Data

One major problem in interviewing could be due to the inability or unwillingness of the respondent to communicate. His/her involvement in the data in terms of his/her responses and the likelihood of any bias should be looked into carefully by the researcher. It needs to be ensured that the respondent does not withhold or distort facts while communicating them to the researcher. Hence, it is advisable to use other means of data collection to cross-validate the information obtained through a questionnaire or schedule.

Memory bias is another factor which affects the quality of data obtained through interviews. To overcome this problem it is suggested that the research design be carried out over a period of time, applying appropriate tools at reasonable intervals as indicated by the research objectives.

We have already discussed that an interview is a highly flexible tool, provided it is conducted by a skilful researcher. It allows a more liberal atmosphere than in the case of other tools of research. Questions not readily grasped by interviewees should be rephrased, or repeated with proper emphasis and explanations wherever necessary. This is quite useful for handling contradictory statements made by the respondents. It also ensures the quality and consistency of responses. However, questions which are generally vague or obscure should be avoided so as to permit precise answers from the respondents. Sometimes, misunderstandings occur when questions involve usage of technical terms or unfamiliar expressions. Inadequate responses are secured if too many choices are offered for too long during the interview.

For enhancing satisfactory face-to-face relationship between the researcher (interviewer) and the respondent (interviewee), the former should be properly introduced to the latter. General letters of introduction are of little value. The introduction should be personal. The interviewer also needs to choose a 'suitable' time and place for conducting the interview. The most suitable place would be one where it is believed that the interviewee will be most at ease. Politeness on the part of the interviewer is essential for gaining the confidence of the interviewee. It is helpful in gathering reliable and quality responses from the interviewees. In the initial meeting, after friendly greetings are exchanged, the interviewer should explain the purpose of interview to the interviewee. It should be stated in terms that can be understood by the interviewees easily. There will be no difficulty in getting frank and sincere responses from the interviewees if they are confident that the interviewer has no ulterior motives but seeks information only for scientific/research purpose.

Patience and perseverance are two important traits of a good interviewer. Listening to responses of an interviewee, especially in unstructured situations, is hard work. It requires self-restraint, self-discipline, patience and humility. Ability to listen with understanding, respect, and curiosity is the gateway to meaningful communication. An interviewee is likely to provide truthful data if he/she feels that he/she will not meet with interruption, denial, contradictions, and other harassments from the interviewer. He/she is motivated to communicate when the atmosphere is congenial and permissive. However, mere listening is not sufficient. A quiet listener (interviewer) must at the same time be an analytical researcher. Hence, the questions must not only be precise and wisely formulated, but must also be phrased in such a way that they display concern for the interviewee's problems. Some questions are necessary and often unavoidable in a long interview. At times, the interview 'runs dry' and needs restimulation. The description of some incidents lacks clarity or completeness. Hence, it is essential for an interviewer to clarify the doubts, if any, to an interviewee so that the accurate information is made available.

Blunt questions must be avoided as they cause antagonism and withdrawal. Indirect questions are helpful in seeking co-operation of the interviewees. Direct questions satisfy only the interviewer and the data or information collected through such questions gives rise to unrelated facts or incidents. These data are useless for scientific purposes.

As a data-gathering device, observation also makes an important contribution to descriptive research. A number of devices like check-lists, schedules, rating scales, and score cards are used for collecting and recording observations and the quality of these data mostly depends on the application and use of these devices. The observer should constantly keep in mind that it is easy to become attracted by conspicuous, dramatic and interesting events/situations. However, he/she should safeguard himself/herself against merely observing unique and striking events which have hardly any relationship with actual reality. The validity and the reliability of measurements are improved when observations are not hurried and are made at frequent intervals by the same observer, or when several observers record their observations independently. An observer must try to minimise the error of ‘halo-effect’ when using a rating scale or a score card. The tendency to rate someone with a pleasing personality high on other traits such as intelligence or professional interest should be curbed. The halo effect is likely to increase when the observer is asked to rate too many factors or traits, which he/she is not trained to judge. Hence, it is advisable to allow only a small number of traits for rating while making observations.

The quality and varacity of data depends greatly on the selection of the tools and their judicious use by researchers. It requires careful calibration of the individuals involved in data collection and also their orientation for the development of skills in the use of various research tools and techniques.

Check Your Progress 3

Describe how you can ensure the quality of data collected?

- (1) using an interview schedule?
- (2) using observation?

Notes: (a) Space is given below for your answer.

(b) Compare your answer with the one given at the end of this unit.

[illegible]

Tools for Research

For the identification of data from various documents and records, the researcher must learn to read them with understanding and insight as a basis for being able to interpret the past, which in turn may help in interpreting present trends and possibly in predicting future events. For this the researcher needs to subject the documents/records to rigorous evaluation. It will involve the dual processes of establishing the authenticity of the source and validity of its contents. This evaluation is called ‘criticism’ of information/data provided by the document/records. The process of establishing authenticity of the data is termed as ‘external criticism’ and that of establishing the validity of their content is termed as ‘internal criticism’. External criticism checks the genuineness and authenticity of the source material. For this the researcher has to determine whether it is what it appears or claims to be and whether it matches with the original so as to save himself/herself from being the victim of a fraud. Through internal criticism the researcher established the validity, credibility and merit of the contents of the document.

Check Your Progress 4

Briefly, state the importance of ‘external and internal’ criticism of documents/records.

Notes: (a) Write your answer in the space given below.

(b) Compare your answer with the one given at the end of this Unit.

4.5 KEY POINTS AT A GLANCE

1. Data are information collected from various sources by using different tools and techniques.
2. Data are either quantitative or qualitative.
3. Parametric data are measured on interval or ratio scales whereas non-parametric data are obtained by applying nominal or ordinal scales of measurement.
4. Qualitative data are verbal and symbolic.

5. The three methods of obtaining data in educational research are (i) one can ask people questions, (ii) one can observe the behaviour of persons, groups or organisations, and their products or outcomes and, (iii) one can utilise existing records or data already gathered for purposes other than one's research.
6. In asking people questions, the researcher may use psychological tests, inventories, questionnaires or schedules.
7. In interviews, schedules called 'interview schedules' are used. They provide an opportunity to the researcher to establish rapport with the subjects (interviewees), explain them the purpose of the study, and the meaning of the items that may not be clear to them.
8. Observation schedules, rating scales, score cards and check lists are used for recording data collected through observations.
9. Existing records and documents include personal letters, life histories, diaries, autobiographies, court records, proceedings of commissions, seminars and conferences, news paper stories, registration and census records etc.
10. Past records and documents provide data for scientific analysis of remote periods and places. These data are provided ready made to the researcher and in a form over which he/she has little control.
11. A valid, reliable and usable tool ensures quality data.
12. The quality of the obtained data depends on the skill with which the tools are used and administered.
13. The validity of the data gathered through questionnaires or schedules is improved considerably by making the language of the questions unambiguous.
14. The reliability of the responses to the questions can be inferred by a second administration of the tool and then comparing the responses with those of the first.
15. The quality of data obtained through interviews mostly depends on the skillful handling of situations by the interviewer. It requires a lot of patience and presurance on the part of the interviewer.
16. A good interview requires self-restraint, self-discipline, patience and humility.
17. Criticism of the documents helps in establishing the authenticity and veracity of data/documents/records.

4.6 LET US SUM UP

In this unit we elaborated on the concept of data, methods of data collection and the precautions which are needed for ensuring quality data.

1. The information collected from various sources with the help of different tools and techniques generally comprises numerical figures, ratings, descriptive narrations, responses to open-ended questions, quotations, field notes, life-histories, proceedings of seminars, conferences, etc. All these are called data.
2. Data are either quantitative or qualitative. Quantitative data are parametric or non-parametric.

3. Parametric data are measured by interval or ratio scales. Non-parametric data are obtained by applying nominal or ordinal scales of measurement. These data are either counted or ranked.
4. Qualitative data are verbal or symbolic materials. The detailed descriptions of observed behaviours, people, situations and events, are some examples of qualitative data.

There are three methods of obtaining data in educational research, (i) one can ask questions by using psychological tests, inventories, questionnaires or schedules, and interviews, (ii) one can observe the behaviour of persons, groups or organizations, and their products or outcomes by using participant or non-participant observation, and (iii) one can utilise existing records or documents like personal letters, life histories, autobiographies, school records, performances or psychological or academic tests, etc.

6. The quality of the data obtained with the help of various tools depends upon their reliability, validity and objectivity in using them.
7. The validity and reliability of the data gathered through questionnaires and schedules are ensured by making the language of questions unambiguous, and also by selecting respondents who possess desired information and are likely to be keen to respond conscientiously and objectively.
8. A good quality data through interviews can be obtained through the willing co-operation of the interviewees.
9. Patience and perseverance, self-restraint and self-discipline, and listening with understanding are important traits of a good interviewer. These traits motivate an interviewee to disclose all the required information with ease and confidence.
10. Checklists, rating scales, score cards and observation schedules are the tools that are used for collecting and recording observations. The quality of these data mostly depends on the application and the objective use of tools. A good observation is not hurried. It is made at frequent intervals by the same observer or by several observers independently at a given time.

4.7 GLOSSARY

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|--------------------|--|
| 1. Data: | Data consists of all relevant materials, past and present, serving as bases for study and analysis. They are quantitative and qualitative. Quantitative data are numerical figures or ratings whereas descriptive narrations, responses, to open ended questions, quotations, field notes etc. are qualitative data. |
| 2. Test/Inventory: | (i) Any tool by which the presence, quality or genuineness of anything is determined; (ii) a device to evaluate the performance and capabilities of an individual or a group, (iii) procedure for eliciting responses upon which an appraisal of the individual concerned can be made. |
| 3. Rating: | A term applied to the expression of opinion or judgement regarding some situation, object or character. |

4. Rating Scale: A scale with a set of points which describe varying degrees of an attitude under study.
5. Score-card: It is an elaborate form of a rating scale.
6. Questionnaire: A series of questions dealing with psychological, social, educational or any other topic sent to an individual or a group, with the object of obtaining data with regard to the topic under study.
7. Schedule: A device consisting of a set of questions which are asked and filled in by an interviewer in a face-to-face conversation with an interviewee. It is used for recording responses of an interview or data in an observation.
8. Check-list: A device consisting of a prepared list of items which the researcher feels are relevant for his/her study. The researcher checks the presence or absence of the items by marking 'yes' or 'no'.
9. Interview: An interview is in a sense an oral questionnaire. Instead of writing the response, the subject gives the needed information orally and face-to-face.
10. Observation: A technique of collecting data by observing activities of individuals in different settings, by talking to them, or studying their constructive or creative products.
11. Structured : The process of observing individuals in controlled observation situations.
12. Document: A record of the events of the past. Personal letters, life histories or accounts of small group processes are the examples of documents.
13. Reliability and Validity of Data: Reliability and validity of the data means the consistency and the truthfulness of the data. These are ensured by using reliable, valid and objectively usable tools.
14. Halo-effect: An error which distorts an observer's ratings of the cluster of traits in an individual. The rater forms a general opinion about the subject's merits and his/her ratings on specific traits are generally influenced by this general impression. The result is that most ratings get distorted.

4.8 CHECK YOUR PROGRESS: THE KEY

1. Data are of two types: (i) Quantitative data and (ii) Qualitative data. Quantitative data are numerical figures obtained by applying interval, ordinal or nominal scales of measurement. Qualitative data are verbal or other symbolic materials.
2. There are three methods of obtaining/collecting data in educational research:
 - (i) one can ask questions by using psychological tests/inventories, questionnaires or interview schedules.

Tools for Research

- (ii) one can observe the behaviour of persons, groups or organisations, and their products or outcomes through participant or non-participant observations. The data are recorded using an observation schedule, a rating scale or a score card.
- (iii) one can utilise existing records or documents available in the form of personal letters, life histories, diaries, registration/census data, etc.

3. Using an Interview Schedule

- (i) Establish rapport with the interviewee(s).
- (ii) Explain to the interviewee(s) the purpose of the study.
- (iii) Choose interviewees carefully by selecting those who are willing to provide the desired information and are likely to be keen to respond conscientiously and objectively.
- (iv) Provide enough flexibility to the interviewees by exhibiting patience, perseverance, self-restraint and self-discipline.
- (v) Motivate the interviewees by asking questions not only precisely and wisely, but which show concern for their problems.

Using observation

Make proper planning with regard to (a) the selection of subject(s) to be observed; (b) selection and arrangement of special condition(s), if any, for the group; (c) physical position of the observer and possible effect on the subject(s) to be observed; (d) the definition of specific activities/characteristics of behaviour to be observed; and (e) training of the observer in recording the behaviour, etc.

- (ii) Effective execution of the task of observing the specific conditions of the subjects; proper handling of the recording instruments/tools, and proper precautions in case of participant observation.
- (iii) Minimal halo-effect error while rating/observing the behaviour.
- (iv) Ensuring the validity and reliability of the observational measurements through observations which are not hurried and are made at frequent intervals by the same observer, or when several observers record their observations independently.

4. External and Internal Criticism of Documents

A rigorous evaluation of the documents is called the criticism of documents. It involves the dual processes of establishing the authenticity of the source and of establishing the validity of its contents. External criticism is helpful in establishing the authenticity of the document(s) and internal criticism establishes their truthfulness, credibility and merit.



Indira Gandhi National Open University

STAFF TRAINING AND RESEARCH INSTITUTE OF DISTANCE EDUCATION

Dear Student,

While studying the units of this block, you may have found certain portions of the text difficult to comprehend. We wish to know your difficulties and suggestions, in order to improve the course. Therefore, we request you to fill out and send us the following questionnaire, which pertains to this block. If you find the space provided insufficient, kindly use a separate sheet.

Questionnaire

Enrolment No.

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1. How many hours did you need for studying the units?

Unit No.	1	2	3	4	5
No. of Hours					

2. Please give your reactions to the following items based on your reading of the block:

Items	Excellent	Very Good	Good	Poor	Give specific examples, if poor
Presentation Quality					
Language and Style					
Illustrations Used (diagrams, tables, etc.)					
Conceptual Clarity					
Check your Progress Questions					
Feedback to CYP Questions					

3. Any other comments:

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