UNIT 1 INTRODUCTION TO PSYCHOLOGICAL RESEARCH – OBJECTIVES AND GOALS, PROBLEMS, HYPOTHESIS AND VARIABLES

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1.0 INTRODUCTION

Let us start our journey into the realm of human mind. A scientific quest for understanding will be the foremost in our journey. We want to know why we think, feel and behave as we do. What makes each of us different from all other people? Why do we often behave as alike in some situations ?

Psychologists try to answer these questions, develop the principles to explain them, and use those principles to solve various problems. The range of application of psychology is very wide. A cognitive psychologist may like to know the causes of forgetting. An organisational psychologist may try to find out nature of resistance among the employees to introduction of new performance appraisal system. A health psychologist may like to examine the relationship between smoking behaviour and coronary heart disease.

While evaluating major areas of psychological researches, a psychologist uses the principles and practices of scientific methods. This unit attempts to acquaint you with nature and relevance of psychological research. This is followed by the process of psychological research within the context of discovery and context of justification as well as distinctive goal of psychological researches.

Finally, the unit deals with indispensable stages of psychological research, i.e. statement of problem, formulation of hypothesis and identifying variables. All the three stages are considered as foundation pillars of psychological research in terms of research design. Precisely, without traveling through these stages the journey for achieving goal via psychological research can not be concluded.

1.1 OBJECTIVES

After reading this unit, you will be able to:

- Describe the research process in terms of how to conduct sound research and how to evaluate critically the research of others;
- Understand why people behave as they do;
- Discuss how to maintain objectivity and minimize the research bias in psychology research;
- Tell others the role of theory, hypothesis and paradigm in psychological research;
- Discuss the primary objectives and goals of psychological research;
- Identify some of the problems one encounters in trying to do reliable and valid research;
- Discuss how to identify and formulate a problem and know the ways in which problem is manifested;
- Enlist the characteristics of good hypothesis and functions of hypothesis; and
- Identifying the variable, types of variable and understand the cause and effect relationship through the manipulation of variables.

Psychology aims at gaining knowledge about behaviour and mental functions. Psychologists are dedicated to theory building and applications for problem solving. The results of empirical studies help verify the prepositions of a theory and may lead to

its modifications. The fruits of psychological research are used in problem solving, in personal, professional and societal contexts.

1.2 NATURE OF PSYCHOLOGICAL RESEARCH

Importance and relevance of psychological research is well recognised almost in every sphere of human life. Notable progress has been reported in the field of organisational behaviour, applied aspects of human being, medical sciences and education, through application of psychological research findings.

Empirical and theoretical researches in psychology are taking place in various fields, such as learning, motivation, perception, concept learning and memory and so on. In the quest of psychological facts, laws and theories, psychologists have found research studies very helpful in gauging human and animal behaviour.

Psychological research attempts to understand why people and animals behave as they do. Psychologists usually define behaviour as overt activities, such as eating, recalling stories, and so on. What about covert psychological processes, such as thinking and feeling? Although thoughts and feelings are not directly observable, they influence such aspects of behaviour as reaction time and blood pressure, which are often used to measure these covert processes.

Practical gains of psychological research are many, yet include discoveries such as improved methods of treating psychologically disordered people, better designs of vehicles to make them easier and safe to use, and new ways of enhancing the performance and happiness of workers.

Before we examine what researchers have found in the major areas of psychology, we need to identify the ways psychologists gather data about behaviour and mental processes. You may be a daily consumer of mass media reports on research findings. Some of these are valuable, some are worthless, and others are confusing and misleading. You will become a wiser consumer of research-based conclusions as you develop your understanding of how psychological research is conducted and why the scientific view of knowledge dictates such methods. Let us turn now how psychologists know what they know.

Recall that psychology is the scientific study of behaviour and mental functioning of individuals. It is scientific because it uses the principles and practices of the scientific method.

Empirical investigation in any field requires the use of the scientific method to observe, measure, and experiment. Even if you never do any scientific research in your life, mastering information on psychological research will be useful. You can improve your critical thinking skills by learning how to ask the right questions about behaviour and how to evaluate the answers you find.

Psychological research process can be divided into two major categories that usually occur in sequence, that is (i) getting an idea [context of discovery] and then (ii) testing it [context of justification].

1.3 THE CONTEXT OF DISCOVERY

This is the initial phase of research during which observations, belief, information, and general knowledge etc., lead someone to come up with a new idea or a different way of thinking about phenomena.

1.3.1 Role of Theories, Hypotheses and Paradigms in Psychological Research

Psychological research focuses on four sets of concerns:

i) the stimulus events that cause a particular response to start, stop, or change in quality of quantity;

ii) the structure of behaviour that links certain actions in predictable, orderly ways to other actions;

iii) the relationships between internal psychological processes or psychological mechanisms and observable behaviour patterns; and

iv) the consequences that behaviour has on the individual's social and physical environment.

Researchers begin with the **assumption of determinism**, the idea that all events (physical, mental and behavioural) result from specific causal factors. Researchers also assume that behaviour and mental processes follow set patterns of relationships that can be discovered and revealed through research.

Psychological theories, in general, attempt to understand how brain, mind, behaviour, and environment function and how they may be related. Any particular theory focuses on a more specific aspect of this broad conception, using a body of interrelated principles to explain or predict some psychological phenomenon.

The value of a theory is often measured in terms of the new ideas, or hypotheses, that can be derived from it and tested. A hypothesis is a tentative and testable explanation of the relationship between two or more events or variables.

A **variable** is any factor that changes, or varies, in size or quality. To illustrate this mood may be a variable, since people's moods may vary from one situation to another. Test performance is another variable, since a person's score may vary from one test to the next.

A **hypothesis** is a testable explanation of the relationship between variables, it is a tentative proposition based on observations, or it could be a hunch about how ideas go together. An instructor, for example, may have a hypothesis about how varying teaching techniques will cause changes in students' test scores. Thus, instructor may have formed this hypothesis by observing students; idea about better teaching techniques is also generated from research in educational psychology.

Finally, our understanding of a complex process is also aided by using the correct paradigm. A **paradigm** is a model of the functions and interrelationships of a process, a "way of thinking" about the world and how to study it. Entire field of knowledge, including psychology, can change directions when new paradigm challenges existing ones. When paradigms shift, revolutions of knowledge usually follow (Kuhn, 1970).

Before a new theory, hypothesis, or paradigm makes a difference in science, it has to undergo an "ordeal of proof." Most often this happens when researchers publish (i.e. make public) their findings, and other scholars investigate whether they find the same patterns in their own data. This process of publication and communication moves scientific research into the public eye, where ideas are tested and proven.

1.3.2 Research Biases

One of the challenges, while doing research is to remain objective and free from biases. Most of your ideas and beliefs are probably linked with certain bias because they are

influenced by your opinions or values. A variety of biases have been found to distort people's impressions of collected data.

External influences such as one's culture or the media can influence people to accept a particular world view.

Personal bias distorts estimating or evaluating processes as a result of personal beliefs, attributes, or past experiences.

Observer bias operates when one's biases act as "filters" through which some events are noticed or seen as meaningful while others are not. It must be kept in mind that researchers themselves were raised in certain cultures and societies. They also might have been exposed to certain gender role expectations. These background factors can all affect the way that researchers observe and interpret events in their lives.

Expectancy bias can affect observations of behaviour by triggering reactions to the events being observed. Researchers sometimes expect to find specific outcomes, and being only human, they may see what they expect to see rather than remain objective. Unfortunately, if one is not alert to the possibility of expectancy bias, it may seem as though the observed events are being "discovered" instead of created by the observer's expectations.

Finally, placebo biases operate when people strongly want to believe a treatment is successful. Believing in the treatment may make an ineffective treatment appear effective. For example, many people may claim to feel better after taking a placebo such as a sugar pill. In those cases where the outcome involves a subjective judgment about results, that is, how well a person feels well or whether the pain has been reduced or relieved, the desire for a drug or therapeutic method to work may be enough to achieve the desired result.

1.4 CONTEXT OF JUSTIFICATION

The context of justification is the second phase of research in which results are prepared for useful communication with other scientists. Psychologists face a difficult challenge when they try to get accurate data and reliable evidence that will generate valid conclusions. They rely on one ally to succeed: the scientific method. Scientific method is a general set of procedures for gathering and interpreting evidence in ways that limit errors and yield dependable conclusions. The scientific method also demands special attitudes and values on the part of research scientists.

1.4.1 Scientific Attitudes and Values

Scientists are motivated by a curiosity about the unknown and the uncertain. Since the truth may be disguised, the scientific method demands a critical and skeptical attitude toward any conclusion until it has been duplicated repeatedly by independent investigations.

By remaining somewhat opened-minded, scientists keep the truth "provisional" subject to revision after new discoveries, but agree to evaluate the phenomena they may personally doubt or suspect. For example, instead of rejecting any possibly that psychic process like ESP (extrasensory perception) really exist; scientists collect evidence on which to base judgments.

Secrecy is banned from the research procedure because all data and methods must eventually be open for public verifiability. Other researchers must have the opportunity to review the data and conclusions and then attempt to replicate the results. Thus science

is not a set of rules but rather a process of asking, observing, explaining, testing, and retesting explanations of reality.

Scientific knowledge is based on respect for empirical evidence obtained through controlled observations and careful measurement. In the realm of science, when good data clash with the opinions of experts, the data win. Science is a way of knowing, and not a hierarchy of experts. You do not need a special degree to act like a scientist, but you do need to make a commitment to objectivity.

1.4.2 Objectivity Safeguards

This consists of (i) procedural safeguards , (ii) standardisation, (iii) operationalisation, (iv) avoiding of bias. Let us take each of these and discuss.

Procedural safeguards

Since subjectivity must be minimized in the data collection and analysis phases of scientific research, **procedural safeguards** are used to increase objectivity. These safeguards begin with keeping complete records of observations and data analyses in a form that other researchers can understand and evaluate. As a result, most scientific reports are written in a similar form and published by organisations of scientists. These reports communicate ideas to the entire scientific community and open those ideas to criticism.

Standardisation

A second safeguard is standardisation. **Standardisation** means using uniform, consistent procedures in all phases of data collection. All subjects should receive the same instructions and be treated in the same way. By applying a standard treatment for all participants in the course of study, researchers ensure they will have the same basic experience.

Operationalisation

A third safeguard involves Standardising the meaning of concepts, known as **operationalisation**. An operational definition of a concept defines that concept in terms of how it is measured or what operations produce it.

For example, an operational definition of the letter grade A in one psychology class might be "90% or higher of all test points possible." This definition tells you that this instructor calculates each student's total performance percentage to determine whether or not that person's work deserves an A.

Operational definitions are especially important because many psychological processes are popular issues and everyday concerns. For example, if new drugs promise to reduce anxiety, you need to know whether the drug manufacturer's definition of anxiety is the same as yours.

For you, "anxiety" may mean occasional nervousness before being evaluated or judged. But for the pharmaceutical company, "anxiety" could mean a set of symptoms experienced by patients in psychiatric hospitals. A drug developed to reduce that kind of anxiety may be inappropriate for your concept of anxiety.

Avoidance of bias

Researchers must also safeguard objectivity by avoiding bias. As explained earlier, bias from external influences, personal beliefs, observers' perspectives, and human

expectations can all distort data. To control, if not totally eliminate such biases, researchers use various controls. If not totally eliminate such biases, researchers use various control procedures to test hypotheses in ways that are fair and error-free.

One control strategy is to keep subjects uniformly ignorant of the purpose of the study. This makes them less likely to perform to researchers' expectations. An even better strategy is to keep subjects uninformed, or blind, about the purpose of the study; this makes them less likely to perform to researchers' expectations.

An even better strategy is to employ uniformed testers to observe uniformed subjects, called the double-blind control. Similarly, when placebo effects might occur, researchers employ a placebo control and compare those who received actual treatment with those who received only attention or a "dummy drug."

For example, to test whether a new drug will help people sleep; some subjects will be given the drug in tablet form while others are given identical tablets (placebo) that do not contain the drug. If the drug is effective, those given the placebo will not sleep better or faster, if it not effective, subjects' sleeping experience will all be similar.

Finally, researchers must be careful to consider all possible influences on the behaviour being studied. As discussed earlier, the independent variable is the factor assumed to influence the behaviour or mental process of interest, the dependent variable. If another factor – called a confounding variable could be confused with the independent variable, it should be eliminated or controlled by keeping it the same ("constant").

For example, a teacher gives some students essay tests and others multiple choice tests on the same material. Which students do you think will do better? Unfortunately, the essay students were all in early morning classes, while the multiple choice students were in late afternoon classes.

Because the time difference is confounded with the test difference, test performance cannot be clearly explained. The teacher should have kept the conditions as similar as possible, with the test type as the only difference, so that other explanations could be ruled out.

Self Assessment Questions

True /False

1) Explaining the reasons for occurrence of a phenomenon indicates control (True/False).

2) Statement about the likelihood that certain behaviour will occur is called prediction (True / False)

3) Independent variable is deliberately manipulated in the experimental group (True/False).

4) An investigator comes up with a new idea or a different way of thinking is known as context of discovery (True/False).

5) Use of uniform consistent procedure in all faces of data collection is known as Standardisation. (True/False).

1.5 CHARACTERISTICS OF PSYCHOLOGICAL RESEARCH

In psychological researches experimental methods are widely used. Therefore, nature of majority of psychological researches is highly scientific. Psychological researches have successfully led to control and manipulation of the variables associated with widely used generic and comparative methods. Psychologists have developed such effective experimental designs that that they have helped to isolate effect of other variables from independent variables.

In psychological researches, rigorous scientific norms and statistical methods are applied in collection, organisation, description and analysis of the data. By turning psychological facts into quantitative form, the nature of most of the psychological researches remains method oriented [scientific].

1.6 GOALS AND OBJECTIVES OF PSYCHOLOGICAL RESEARCH

Every science has goals. In physics, the goals are concerned with learning how the physical world works. In astronomy, the goals are to chart the universe and understand both how it came to be and what it is becoming.

The goals of psychologist conducting basic research are to describe, explain, and predict and control behaviour.

The applied psychologist has a fifth goal also, that is application of psychological techniques and principles to improve the quality of human life. Most applied psychologist are able to conduct their own basic research, scientifically studying particular problem in order to solve them. The process of accomplishing one goal and moving on to the next is ideally a natural , flowing , experience, energized, by the psychologist's interest in the question being studied.

16.1 Description: What is Happening?

The first step in understanding anything is to give it a name. Description involves observing a behaviour and noting everything about it, as for example, what is happening, where it happens, to whom it happens, and under what circumstances it happens.

For example, a teacher might notice that a young girl in second grade classroom is not behaving properly. She's not turning in her homework, her grades are slipping badly, and she seems to have a very negative attitude toward school. The teacher here describes the student's behaviour, and this description of what she is doing gives a starting place for the next goal : why is she doing it?

1.6.2 Explanation: Why is it Happening?

To find out why the girl is not behaving properly, the teacher would most likely ask the school counselor to administer some tests. Her parents might be asked to take her to a pediatrician to make sure that there is no physical illness, such as an allergy. They might also take here to a psychologist to be assessed. In other words, the teacher and others are looking for an explanation for the young girl's behaviour.

Finding explanation for behaviour is a very important step in the process of forming theories of behaviour. A theory is a general explanation of a set of observations or facts.

The goal of description provides the observations, and the goal of explanation helps to build the theory.

If all the tests seem to indicate that the young girl has a learning problem, such as dyslexia (an inability to read at expected levels for a particular age and degree of intelligence), the next step would be trying to predict what is likely to happen if the situation stays the same.

1.6.3 Prediction: When Will it Happen Again?

Determining what will happen in the future is a prediction. In the example, the psychologist or counselor would predict (based on previous research into similar situations), that this little girl will probably continue to do poorly in her schoolwork and may never to be able to reach her full learning potential.

Clearly, something needs to be done to change this prediction, and that is the point of the last of the four goals of psychology: changing or modifying behaviour.

1.6.4 Control : How can it be Changed ?

Control, or the modification of some behaviour, has been somewhat controversial in the past. Some people hear the word control and think it is brainwashing, but that is not the focus of this goal. The goal is to change a behaviour from an undesirable one (such as failing in school) to a desirable one (such as academic success). Such efforts also include attempts at improving the quality of life.

In the example of the young girl, there are certain learning strategies that can be used to help a child (or an adult) who has dyslexia . She can be helped to improve her reading skills.(Aylward etal,2003;Shaywitz,1996). The psychologist and educators would work together to find a training strategy that works best for this particular girl.

1.6.5 Application

Improving the quality of life

Psychological research are often conducted to solve various problems faced by the society at different levels such as individual, organisation, or community. Psychological applications to solve problems in diverse settings, such as in a classroom in a school, or in an industry, or in a hospital, or even in a military establishment, demand professional help. Applications in the health sector are remarkable. Because of these efforts quality of life becomes a major concern for psychologists.

Not all psychological investigations will try to meet all five of these goals. In some cases, the main focus might be on description and prediction, as it would be for a personality theorist who wants to know what people are like (description) and what they might do in certain situation (prediction).

Some psychologists are interested in both description and explanation, as is the case with experimental psychologists who design research to find explanations for observed (described) behaviour. Therapists, of course, would be more interested in control, although the other four goals would be important in getting to that goal.

Self Assessment Questions

1) Scientific knowledge is not based on empirical evidences. (True/False).

2) Psychologists should not maintain objectivity by avoiding biases. (True/False).

3) Psychological researches should be replicable (True/False).

4) When there is no gap in results of several investigations in the same field, problem exists. (True/False).

5) A tentative testable proposition of the relationship between two or more variable is called hypothesis. (True/False).

1.7 PROBLEM

1.7.1 Nature and Meaning

A scientific inquiry starts when a researcher has already collected some information/ knowledge and that knowledge indicates that there is something we do not know. It may be that we simply do not have enough information to answer a question, or it may be that the knowledge that we have is in such state of distorted form that it cannot be adequately related to the question. Here a problem arises.

The formulation of a problem is especially important, as it guides us in our inquiry. According to Townsend (1953) 'a problem is a question proposed for solution'.

According to Kerlinger (1964) 'A problem is interrogative sentence of statement that asks: What relation exists between two or more variables'.

According to McGuigan (1964) 'A solvable problem is one that posses a question that can be answered with the use of man's normal capacities'.

1.7.2 Characteristics of a Scientific Problem

After analysing above written definitions of a problem statement, it can be said there are certain characteristics of a problem statement:

i) A problem statement is written clearly and unambiguously, usually in question form. A few examples of problem statement are given below:

- What is the relationship between IQ and class-room achievement?
- What is the relationship between anxiety and adjustment among school going children?
- Do students learn more from a lecture method than from discussion method?

ii) A problem expresses the relationship between two or more than two variables. This kind of problem permits the investigator to manipulate two or more than two variables to examine the effects upon the other variables. For example: Do teacher reinforcement cause improvement in student performance? In this example, one variable is teacher reinforcement and the other variable is student performance. It illustrates the problem found in a scientific study because the problem statement explores the effect of teacher's reinforcements on student performance. The conditions for a problem statement are:

- The problem should be testable by empirical methods
- A problem statement should be solvable.
- The data of a scientific problem should be quantitative.
- The variable relating to the problem should be clear and definite.

1.7.3 Ways in which a Problem is Manifested

A problem is said to exist when we know enough that there is something we do not know really. There are atleast three ways in which a problem is said to be manifested:

Gap in knowledge: A problem is manifested when there is a noticeable gap or absence of information. Suppose a community or group intents to provide psychotherapeutic services, two questions arise, viz., (i) What kind of psychotherapy they should offer and (ii) Which one of the different forms of therapeutic methods is most effective for a given type of mental disease.

In this example, there exists a noticeable gap in the knowledge, and hence the collection of necessary data and their explanation are needed for filling the gap in knowledge.

Contradictory results: When several investigations done in the same field are not consistent and therefore, at times, contradictory, a problem is to find out a new answer and settle the controversy.

Explaining a Fact: Another way in which we become aware of a problem is when we are in possession of a 'fact', and we ask ourselves, "Why is this so ?" When the facts in any field are found in terms of unexplained information, a problem is said to exist.

1.7.4 Identifying A Research Problem

The identification of a research problem may be accomplished in a variety of ways (i) observations of every day life,

- thinking or brainstorming sessions
- theoretical predictions and explanations,
- technological developments which make new research possible
- problems suggested in the research literature; or any combination of these methods.

1.7.5 Considerations in Selecting a Research Problem

When selecting a research problem/topic there are a number of considerations to keep in mind these considerations are **interest, magnitude, measurement and clarity about the concept, level of expertise, relevance, availability of data and ethical issues**. If you select a problem without considering these issues it could become extremely difficult to sustain the required motivation and interest, and hence its completion as well as the amount of time taken could be affected.

1.7.6 The Importance of Formulating a Research Problem

The formulation of a research problem is the first and most important step of the research process. It is like the identification of a destination before undertaking a journey. As in the absence of a destination, it is impossible to identify the shortest route, so also in the absence of a clear research problem, a clear and economical plan is impossible.

A research problem is like the foundation of a building. The type and design of the building is dependent upon the foundation. If the foundation is well designed and strong you can expect the building to be also strong and well designed. In the case of research, the research problem serves as the foundation of a research study. If it is well formulated, you can expect a good study to follow.

According to Kerlinger(1986), if one wants to solve a problem, one must generally

know what the problem is. It can be said that a large part of the problem lies in knowing what one is trying to do.

You must have a clear idea with regard to what it is that you want to find out **about** and not what you think you must find.

A research problem may take a number of forms, from the very simple to the very complex. The way you formulate a problem determines almost every step that follows, that is (i) the type of study design that can be used, (ii) the type of sampling strategy that can be employed, (iii) the research instrument that can be used or developed (iv) and the type of analysis that can be undertaken.

The formulation to a problem is like the 'input' into a study, and the 'output' – the quality of the contents of the research report and the validity of the associations or causation established – is entirely dependent upon it. Hence the famous saying about computers – 'garbage in, garbage out' – is equally applicable to a research problem.

Self Assessment Questions

1) Operational definition of a concept is not necessary in scientific research. (True/False)

2) The first goal of psychological research is to provide explanation.(True/False)

3) The variable in which change is desired is called independent variable. (True/False).

4) The variable manipulated by the experimenter is called dependent variable (True/False).

5) The variable that intervenes between the Dependent and Independent variable is Intervening variable. (True/False).

1.8 HYPOTHESIS

In conducting research, the second important consideration after the formulation of a research problem is the construction of hypothesis. As you know any scientific inquiry starts with the statement of a solvable problem, when the problem has been stated, a tentative solution in the form of testable proposition is offered by the researcher. The testable proposition and potential answer are termed a hypothesis

Therefore a hypothesis is nothing but a suggested, testable and proposed answer to a problem.

By stating a specific hypothesis, the researcher narrows the focus of the data collection effort and is able to design a data collection procedure which is aimed at testing the plausibility of the hypothesis as a possible statement of the relationship between the terms of the research problem.

1.8.1 Definition of Hypothesis

Several experts have defined hypothesis more or less in the same way. According to Kerlinger (1973), a hypothesis is a conjectural statement of the relation between two or more variables.

According to Mcquigan (1970) hypothesis is a testable statement having the potential relationship between two or more variables. In other words, the hypothesis in one way is advanced as a potential solution to problem.

On the basis of these definitions two criteria for good hypothesis and hypothesis statement can be suggested:

i) Hypotheses are statements about the relation between variables.

ii) Hypotheses carry clear implication for testing the stated relations.

These criteria mean that hypothesis contains two or more variables which are measurable or potentially measurable and hypothesis exhibits either a general or specific relationship between the variables.

1.8.2 Characteristics of a Hypothesis

There are a number of considerations one should keep in mind when constructing a hypothesis, as they are important for valid verification.

Hypothesis should be simple, specific and conceptually clear. There is no place of ambiguity in the construction of a hypothesis it should be 'unidimensional i.e. it should test only one relationship at a time. For example; the average scores in maths subjects of the male students in the class is higher than the female students.

Suicides rates very inversely with the social cohesion (Black & Champion 1976).

A Hypothes thus should be capable of verification: methods and techniques must be available for data collection.

A hypothesis should be operationlisable. This means that it can be expressed in terms that can be measured. If it cannot be measured and tested and, hence, no conclusions can be drawn.

A Hypothesis should be related to the existing body of knowledge.

A hypothesis has equal chances of confirmation and rejection.

A hypothesis should be parsimonious. (economical)

A hypothesis should be method oriented.

In the construction of hypotheses the student must observe the above mentioned rules. Forming acceptable hypotheses is not difficult if the problem giving rise to the hypotheses has been carefully stated and defined.

The form of a hypothesis can be a declarative statement containing a suggested answers to the problem, and which obeys the formal conditions of hypothesis.

Following are two examples of problems and their respective hypothesis.

Problem 1: Does practice with the preferred hand improve the proficiency of the nonpreferred hand in the mirror drawing experiment ?

Hypothesis: Practice with the preferred hand significantly improves the proficiency of the nonpreferred hand in the mirror drawing experiment.

Problem 2: Are male rats more active than the same strain of female rats during a 6-day period spent in an activity cage ?

Hypothesis: Male rats are not significantly more active than the same strain of female rats during a 6-day period spent in an activity cage.

1.8.3 Functions of Hypothesis

A hypothesis serves the following functions:

i) The formulation of a hypothesis provides a study with focus.

ii) It tells you what specific aspects of a research problem to investigate

iii) It tells what data to collect and what not to collect

iv) The construction of a hypothesis enhances objectivity in a study.

The process of testing a hypothesis goes through 3 phases as given below (Kumar, 2002 : Research methodology))

Phase I: Formulate your hunch or assumption

Phase II: Collect the required data

Phase III: Analyse data to draw conclusion about the hunch – true or false.

A hypothesis may enable you to add to the formulation of theory. It enables you to specifically conclude what is true or what is false.

Self Assessment Questions

Multiple Choice Questions

1) A psychologist is interested in what a particular person might do in a stressful situation. This psychologist is most interested in the goal of :

   a) description b) explanation

   c) prediction d) control

2) The first step in studying animal behaviour is to observe animals and record everything they do, when they do it, and what is going on around them when they do it. This meets the goal of :

   a) description b) explanation

   c) prediction d) control

3) Experimental psychologists, who design experiments to determine the causes of behaviour, would be most interested in the goal of

   a) description b) explanation

   c) prediction d) control

4) Psychologists who give potential employees tests that determine what kind of job those employees might best fit are interested in the goal of

   a) description b) explanation

   c) prediction d) control

5) A researcher designs an experiment to test the effects of playing video games on memory. What would be the dependent variable?

   a) scores on a memory test

   b) playing video games

c) number of hours spent playing video games

d) the type of video game played

6) In that same experiment, the experimental group would not play the video games but take the memory test, while the control group would not take the memory test while the control group would play the video games. (What would be the dependent variable?)

a) scores on a memory test

b) playing video games

c) number of hours spent playing video games

d) the type of video game played

7) In a _____ study, neither the experimenter knows nor the participant knows who is in the control group and who is in the experimental group.

a) placebo b) single blind

c) double – blind d) triple blind

8) Double – blind studies are to control

a) the placebo effect

b) the experimenter effect

c). extrinsic motivation

d) the experimenter effect

9) In a psychologist's classic experiment of the effects of reward on creativity, what was the dependent variable?

a) the special instructions to each group

b) the collage party

c) the ratings of creativity from the experts for each child's collage

d) the size of the collages.

10) In an experiment, the variable which is varied is called the ____ variable, while the behaviour which is studied, is called the ____ variable

a) Independent, dependent

b) Dependent, independent

c) Control, observed

d) Stimulus, response

1.9 VARIABLES

After the statement of problem under investigation and the formulation of hypothesis, the researcher is now prepared to design an experiment for the specific purpose of testing whether his/her hypothesis is accepted or rejected.

During the planning of research design empirical study of different factors of related phenomena is required. Therefore, the nature of antecedent and consequent factors related to phenomena or events is very important to understand conceptual clarity and quantitative accuracy. These factors are known as variables in scientific research.

1.9.1 Meaning of Variable

A variable, as the name implies, is something which varies. This is the simplest and the broadest way of defining a variable.

Webster says that a variable is "a thing that is changeable" or "a quantity that may have a number of different values."

True, a variable is something that has at least two values, however, it is also important that the values of the variable be observable. Thus, if what is being studied is a variable, it has more than one value and each value can be observed. For example, the outcome of throwing a die is a variable. That variable has six possible values (each side of the die has from one to six dots on it), each of which can be observed.

In psychology, the variables of interest are often behaviours or the causes of behaviours. Many psychologists have adopted a theoretical viewpoint or model called the S-O-R model to explain all behaviour.

The symbols S, O, and R represent different categories of variables.

S is the symbol of stimuli, and the category may be referred to in general as stimulus variables. A stimulus variable is some form of energy in the environment. Such as light, to which the organism is sensitive.

O is the symbol for organismic variables – the changeable physiological and psychological characteristics of the organisms being observed. Examples of such variables are anxiety level, age and heart rate.

Finally, R is the symbol for response and, in general, response variables, which refer to some behaviour or action of the organism. Saying "yes," running and pressing a lever are examples of responses variables.

However, a behavioural scientist attempts to define a variable more precisely and specifically. Kerlinger (1964) has defined variable as a property that takes on different values.

According to D'amato (1970) variables may be defined as those attributes of objects, events, things and beings, which can be measured. In other words variables are the characteristics or condition that can be manipulated controlled or observed by the experimenter. Sex, IQ, level of aspiration, anxiety, coping strategies, socio-economic status, and achievement etc. are examples of variables commonly employed in psychological research.

Some of the variables used in behaviour researches are true dichotomies i.e. male female, alive dead, employed unemployed. Some variable are polytomies – for example religion preference – Hindu, Muslim, Jain, Christians and Sikhs etc. However, most variable are theoretically capable of taking on continuous variable.

1.9.2 Classification of Variables

A variable can be classified in a number of ways. The classifications have been done from looking at variables in three different ways:

i) The causal relationship

ii) The design of the study

iii) The unit of measurement

Table showing Classification of variables is given below

Variables		**Independent Variables**	**Type S** **Type E**
		Dependent Variables	
		Extraneous variables	
	Causal relationship		
	Causal relationship	**Intervening variables**	
	Designed study	**Active variable**	
	Designed study	**Attribute variables**	
	Unit of measurement	**Qualitative variables**	
	Unit of measurement	**Quantitative variable**	**Continuous variables**
			Discrete variables

1.9.2.1 From the Viewpoint of Causation

i) Change variables, which are responsible for bringing about change in a phenomenon;

ii) Outcome variables, which are the effects of a change variables.

iii) Variable which affect the link between cause-and-effect variables;

iv) Connection or linking variables, which in certain situations are necessary to complete the relationship between cause and effect variables. (Shown in the table below)

	Connecting or linking variables (4)	
Cause		Effect
Change variables (1)		Outcome variables (2)
	Variables that affect the relationship (3)	

In psychological research change variables are called independent variables. Outcomes/ effect variables are called dependent variables, the unmeasured variables affecting the cause-and-effect relationship are called extraneous variables and the variables that link a cause and effect relationship are called intervening variables. Hence:

Independent variables : An independent variable is that factor manipulated by the experimenter in his attempt to ascertain its relationship to an observed phenomenon.

Dependent upon the mode of manipulation some experts have tried to divide the independent variable into type - E independent variable in Type - S independent variable (D'Amato, 1970).

Type E independent variable is one of which is directly or experimentally manipulated by the experimenter and type S independent variable is one which is manipulated through

the process of selection only. For example the experimenter wants to study the effect of noise upon the task performance in an industry. Here the Independent variable (IV) is the noise and the dependent variable (DV) is the task performance. He may manipulate the noise by dividing into the three categories – continuous noise, intermittent noise and no noise and examine its effect upon the task performance. Here the noise is being directly manipulated by the experimenter and hence, it constitutes the example of Type-E independent variable.

Suppose, the experimenter is interested in answering the question : Is the rate of production dependent upon the age of the workers? Age is here the independent variable.

For investigating this problem, the experimenter will have to select groups of workers on the basis of their age in a way by which he can get an appropriate representation from different age groups ranging from say, 16 to 55 years. Subsequently, he will compare the rate of production obtained by each age group and finally, conclude whether or not age is a factor in enhancement of the performance.

Dependent variable: A dependent variable is that variable which appears, disappears, or, removed or varies when the experimenter manipulates and changes the independent variable.

A few examples of hypothesis with their independent variables indicated are given below:

Hypothesis 1 : As the number of trials increases errors decrease.

Independent variable : No. of the trials

Dependent variable **:** Errors committed by the subject.

Hypothesis 2 : Individuals were feeble minded have lower intelligence than do individuals whose parents were not feeble minded.

Independent variable : presence or absence of feeble mindedness in the parents.

Dependent variable **:** the amount of intelligence possessed by the individuals whose parents were feeble minded as compared to the intelligence of those whose parents were not feeble minded.

Extraneous variables: Several other factors operating in a real life situation may affect changes in the dependent variable. These factors, not measured in the study, may increase or decrease the magnitude or strength of the relationship between independent and dependent variables.

Intervening variables: Intervening variables sometimes called the confounding variable (Grinnell 1988; 203), links the independent and dependent variables. In certain situations the relationship between an independent and a dependent variable cannot be established without the intervention of another variable. The cause variable will have the assumed effect only in the presence of an intervening variable.

To explain these variables let us take some examples. Suppose you want to study the relationship between smoking and coronary heart disease. You assume that affecting this relationship, such as a number of cigarettes or the amount of tobacco smoked every day; the duration of smoking; the age of the smoker; dietary habits; and the amount of exercise undertaken by the individuals. All of these factors may affect the extent to which smoking might cause coronary heart disease. These variables may either increase or decrease the magnitude of the relationship.

In this example the extent of smoking is the independent variable, coronary heart disease is the dependent variable and all the variables that might affect this relationship, either positively or negatively, are extraneous variables.

These relationships are explained below in the table.

Table: Independent, dependent and extraneous variables in causal relationship

Smoking		**Coronary Heart Disease**
(Assumed cause)		**(Assumed effect)**
Independent		**Dependent varfiable**
	Affect the relationship	
	The age of the person	
	Extent of his or her smoking **Duration of smoking** **The extent of daily exercise etc.**	
	Extraneous variables	

1.9.2.2 From the Viewpoint of the Study Design

Active variables

A variable which is manipulated by the experimenter is the active variable. Examples of active variables are reward, punishment, methods of teaching etc.

Attribute variable

A variable which is not manipulated but measured by the experimenter is the attribute variable or organismic variable. Some of the examples of attribute variables are age, sex, intelligence, race, anxiety, etc.

1.9.2.3 From the Viewpoint of the Unit of Measurement

Qualitative and Quantitative variables

The quantitative variables refer to those variables which consist of categories that cannot be ordered in magnitude. We cannot make such a statement regarding the qualitative variables, e.g., "category X possesses higher (or lower) magnitude of the variable than category "Y".

Sex, race and religion are examples of qualitative variables. The quantitative variables refer to those variables which are composed of categories that can be ordered in magnitude.

Intelligence age, levels of illumination, intensity of sound etc., are the examples of quantitative variables.

Continuous Variables and Discrete Variables

Quantitative variables are further divided into two categories, namely, continuous variables and discrete variables. A continuous variable is one which is capable of being

measured in any arbitrary degree of fineness or exactness. Age, height, intelligence, reaction time, etc., are some of the examples of a continuous variable.

The age of the person can be measured in years, month and days. Thus, all such variables which can be measured in the smallest degree of fineness, are examples of the continuous variable.

Discrete variables (also known as categorical variables) are those variables which are not capable of being measured in any arbitrary degree of fineness or exactness because the variables contain a clear gap. For example, the number of members in a family constitutes the example of a discrete variable.

1.10 LET US SUM UP

Psychological researches use the scientific method to test the ideas developed within the context of discovery and the context of justification. In the discovery phase of research, observation, belief and information lead to a new way of thinking about a phenomenon.

External and internal biases can distort the discovery phase because our conclusions are often subject to personal biases, observer biases, expectancy biases, and placebo biases.

Psychologist use scientific theories, testable hypothesis, and creative paradigms to unravel the mysteries of mind and behaviour.

In the justification phase, ideas are tested and either disconfirmed or proven.

Psychologist must maintain objectivity by keeping complete records, Standardise procedures, make operational definitions, minimize biases and control errors. A reliable result is one that can be repeated in similar conditions by independent investigators.

The goals and objectives of psychological research are: (1) to describe objectivity the behaviour of individuals. (2) To develop an understanding of the causes and consequences of the behaviour using explanations based on both the best available evidence and creative imagination. (3) To predict whether, when, how, and in what condition, a given behaviour form will occur; and (4) possibly to control a behaviour by making it start, stop, or vary in some predictable way (5) To improve the quality of individual lives and human society.

The formulation of research problem is the most important step in the research process. It is the foundation, in terms of design on which you build the whole study. Any defects in it will adversely affect the validity and reliability of the study.

Hypotheses, as testable propositions are important for bringing clarity, specificity and focus to a research study. Similarly knowledge of the different types of variable and the way they are measured plays a crucial role in research. They affect how the data can be analysed , what stabilised tests can be applied to the data , what interpretation can be made. How the data can be presented and what conclusions can be drawn. A variable can be clarified from three perspectives that are not mutually exclusive; causal relationship, design of study and unit of measurement.

1.11 UNIT END QUESTIONS

1) What are the goals of psychological inquiry?

2) What are the main types of variables? Give examples of each type of variable.

3) What are the placebo and the experimenter effects?

4) How do single blind and double blind studies control the experimental effects?

5) How can you minimize research biases in psychological research?

6) What is role of theory in scientific research?

7) Differentiate between independent and dependent variable with suitable example.

8) What is difference between research problem and research hypothesis?

9) What is the role of discovery of justification in psychological research?

10) What is hypothesis? Write down functions of hypothesis.

1.12 GLOSSARY

Empirical Investigation : Research that relies on sensory experience and observation as research data.

Context of Discovery : Initial phase of research during which an investigator comes up with a new idea or a different way of thinking about phenomena.

Theory : A body of interrelated principles used to explain or predict some psychological phenomenon.

Hypothesis : A tentative and testable explanation of the relationship between two or more events or variables.

Paradigm : A model of the functions and interrelationships of a process; a "way of thinking" about the world and how to study it.

Context of Justification : Second phase of research, in which results are tested and prepared for useful communication with the scientific community.

Standardisation : The use of uniform consistent procedures in all phases of data collection.

Operational Definition : Definition of a concept in terms of how the concept is measured or what operations produce it.

Blind : Uninformed about the purpose of a research study.

Double-blind Control : A control strategy that employs both uninformed experimenters and uninformed subjects.

Placebo Control : A control strategy where researchers compare those who received actual treatment with those who received only attention or a "dummy drug."

Confounding Variables : Factors that could be confused with the independent variable in a research study and thus distort the results.

Problem : An interrogative statement that asks: What relation exists between two or more variables?

Variable : something that can occur with different values and can be measured.

Independent Variable : a variable that represents the hypothesized "cause" that is precisely controlled by the experimenter and independent of what the participant does.

Dependent Variable : a variable that represents the hypothesized "effect "whose values ultimately depend on the values of independent variable.

SAQ ANSWERS:

1) F, 2)T, 3)F, 4)T, 5)T, 6)T, 7)F, 8)F, 9)T, 10) F, 11)T, 12)F, 13)F, 14)T, 15)F

MCQ ANSWERS:

1)c, 2)a, 3)b, 4)c, 5)a, 6)d, 7)c, 8)c, 9)c, 10)a.

1.13 SUGGESTED READINGS

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UNIT 2 INTRODUCTION TO PSYCHOLOGICAL EXPERIMENTS AND TESTS

Structure

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2.9 Let Us Sum Up

2.10 Unit End Questions

2.11 Glossary

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2.0 INTRODUCTION

We often debate why people act as they do. While we read the newspaper daily in the morning, we tend to seek answer in the interesting or even amazing news item; for example, what caused two colleges students to attack their own friend? Why do people smoke? How do people behave after drinking? Psychologists can not answer these questions directly but help us to understand what influence aggression, drug use and thinking when drinking. In every day life, many factors influence our behaviour. Psychologists conduct experiments in order to explain the causes of particular behaviour.

Similarly, while undertaking research, psychologists become interested in different types of variables and concepts. The adequate description, measurement and analysis pose a difficult challenge before them. Most of the psychological variables, that is, intelligence, personality, attitudes, values and interest are not directly accessible creating ambiguity in scientific analysis and communication. In order to overcome these problems, psychologists use a variety of tools/test for collecting necessary data and information. The range of psychological tests is very wide consisting of verbal, behavioural and physiological measures. Therefore, well designed experiment and Standardised psychological tests both are important in describing, understanding and predicting behaviour of individuals in psychological research.

This unit focuses mainly on psychological tools that is, experiment and test which are used in psychological research. In the first part, you will find the basic concept of experiment as determining cause and effect of different variables. Then the main features of the experiment which is manipulation of the independent and dependent variable, importance of randomization and use of control in experiment are explained. Later you will be acquainted with advantage and disadvantage of the experimentation. Second part of this unit begins with the nature and characteristics of psychological tests and you will study the various types of psychological tests in terms of administration, scoring method and interpretation. At the end some of the important properties of psychological tests such as reliability, validity and norms will be described.

2.1 OBJECTIVES

After reading the unit, you will be able to:

- Define experiment and explain why psychologists conduct experiment;
- Describe how manipulation of the variables takes place in an experiment;
- Discuss importance of random assignments of the subjects in experimental/ controlled conditions;
- Tell others how a real experiment might be conducted;
- Discuss the uses of control and certain technique of control which are used to achieve control over the extraneous variables;
- Enlist the advantages and disadvantages of experimentation;
- Define the basic terms pertaining to psychological tests;
- Describe the major types of psychological tests;
- Tell others the uses of testing;
- Distinguish between an individual test and group test;
- Distinguish between ability test and personality test; and
- Explain the relevance of psychological tests in contemporary society.

2.2 EXPERIMENT

The most powerful scientific method is the experiment. Experiment provides the strongest tests of hypothesis about cause and effect. The investigator carefully controls conditions often in a laboratory and take measurement in order to discover the causes of relationship.

2.2.1 Definition

According to Festinger & Katz (1953) 'the essence of experiment may be described as the observing the effect on a dependent variable of the manipulation of independent variable'. According to Edwards (1971) 'when certain variable can be controlled or manipulated directly in a research problem by the investigator, the research procedure is often described as experiment'. According to Chapin (1974) 'an experiment is an observation under controlled condition'.

You can understand the basic idea of experiment through the following example; Imagine that some researcher wants to study the effect of alcohol consumption on thinking ability – before administering a thinking test, they would manipulate alcohol consumption [by giving some people strong drink laced with alcohol and others the same drink without alcohol] by randomly assigning people to the two condition holding other factors constant. This would eliminate alternative explanation for why thinking might vary with drinking. With the variation in the experimental factor [here, for example the alcohol] the behaviour changes, then the factor is having an effect.

On the basis of these definitions and related examples above, two salient features of the experiment emerge i.e. (i) Manipulation of the variables and (ii) Control in experiment.

2.2.2 Manipulation of the Variables

Manipulation refers to the deliberate or active change introduced by the experimenter in an event to see its effect on behaviour. It involves arranging for the appearance of different quantities or different values of a variable.

2.2.3 Control in Experiment

No experiment is better than its poorest control. This statement is the major issue involved in any experimental attempt to arrive at factual knowledge. Boring (1954) has identified some uses of the word "control"

a) Control is used to refer to the comparison of results for the purpose of verification.

b) Control is also used to refer to arranging conditions in such a way that some behaviour will occur. (c) Control is used to refer to the practice of eliminating or holding constant the effects of extraneous variables.

Since the purpose of psychological research is to discover the relationships between independent and dependent variables, care must be taken that the changes that are observed in the dependent variable are due to the independent variable and not to extraneous variables.

In order to achieve control over the relevant variables, which are extraneous to the conduct of an experiment, experimenters use certain techniques. Some of the important techniques are listed below:

Since the goal of an experimenter is to minimize the extraneous variables, the best way to handle this problem is to eliminate that variable from the experimental settings.

If elimination is not possible then effort needs to be made to hold them constant so that their effect remains the same throughout the experimental setting.

In case of controlling organism and background variables, matching is also used. In this procedure, the relevant variable are equated or held constant across all the conditions of experiment.

To control practice and fatigue effects counter balancing methods is used. It is an interesting way to minimize the effect of order or sequence. Suppose there are two tasks to be given in an experiment. The experimenter may interchange the order of the tasks. Thus, half of the group may receive the tasks in the order of A and B while the other half in the order of B and A.

Random assignment of participants to different groups eliminates the potential systematic differences between groups.

2.2.4 Advantages and Disadvantages of Experiment

Advantage of experimentation:

1) Through the experiment, cause and effect relationship can be established.
2) An experiment is replicable.
3) An experiment provides a great degree of precision in manipulation of the independent variables.
4) An experiment has sufficient degree of internal validity.
5) Findings, drawn as a result of experimentation, are said to be more objective, accurate and reliable.
6) Thus experiment is the best method of hypothesis testing.

Disadvantage of Experimentation

1) During an experiment, behaviour is often studied in an artificial environment, that is the laboratory where the situation and conditions are controlled so heavily that behaviour is a distortion of what would occur naturally.
2) Research subjects typically know they are in an experiment and are being tested and measured.
3) They may react to this awareness by trying to please the researcher.
4) They may guess the purpose of the research, and thus will change behaviour accordingly.
5) If they know they are being monitored, they will behave in a different way than if they were unaware of being monitored.
6) An experiment is a simplified version of reality, and at times it is too simplified to tell us much about real life.
7) Some people challenge experimental research on ethical grounds.

Precisely, experiment is the crown jewel among psychology's method or answering questions about behaviour. When it is used with skill and care, the experimental method yields results that help us not only to answer complex questions about human behaviour, but also to understand the causes of such behaviour. Thus, experimentation is psychology's ultimate answer to the question.

2.3 INDEPENDENT AND DEPENDENT VARIABLES

The purpose of an experiment is to find out whether changes in one variable (let us call it X) cause changes in another variable (let us call it Y). In other words, he or she tries to find out how X affects Y. Here, X is referred to as independent variable and Y as the dependent variable.

As you know the event manipulated or altered by the experimenter is termed as independent variable (IV). It is the potential cause that one wishes to investigate. The behaviour of interest in which changes is brought by the independent variable is termed as dependent variable (DV). It is dependent because what happens to it is on account of the manipulation done by the experimenter. In other words it depends on what has been done to the participants, the treatment or manipulation. A dependent variable is the factor assessed by the investigator following the manipulation. It represents the potential effect of concern.

The independent variable may be an object of the environment, for example, intensity of light/ sound, continuous or discontinuous noise, kind of the learning material – meaningful and nonsense etc. Each one is called a stimulus variable because each one is quality of an external object or event.

The independent variable may also be a characteristic of the organism, for example, her/his religion or caste, age, intelligence, sex, learning capacity, skills, and so on. These are called organismic variables.

2.3.1 Ways of Manipulating the Independent Variable

There are two ways of manipulating the independent variable. One way is to make it appear in one situation and disappear in another situation and observe how this affects the dependent variable. Suppose you are trying to find the effect of noise on the solving of complex arithmetical problems. You let your subject work on the problems in the absence of noise and under noise and you note/record the time taken in both conditions. If you find that your subject has taken longer time in second phase, you explain this as due to distraction from the noise. The situation in which we introduce an independent variable is called experimental condition. The situation from which it is not presented is called controlled condition.

The other way to manipulate the independent variable is to change its value, increase or decrease its amount. If the change in the value of the independent variable is followed by a change in the value of the dependent variable you presume that two are related. Suppose you want to determine relationship between number of items in a list of words and speed of learning. The independent variable here is the number of items or the amount of learning material. You can increase or decrease it, by having lists containing different numbers of items. If you find that a shorter list is learned more quickly than a longer list, you come to the conclusion that the speed of learning depends upon the amount of learning material.

Self Assessment Questions

Multiple Choice Questions

1) In Order to achieve control over the relevant variables which are extraneous to the conduct of an experiment, experimenters use certain techniques. The one which does not belong to it is:

   a) Counter Balancing, b) Random Assignment

   c) Matching, d) Evaluating

2) In a psychological experiment, the independent variable is applied to:

   a) The control group only, b) The experimental group only

   c) Either the control group or the experimental group

   d) Both the control group and the experimental group

3) Variables that are held constant in the experimental method are:

   a) The independent variable, b) The dependent variable

   c) Both independent and dependent variable

   d) Relevant variables except the independent variable

4) A study in which a variable is manipulated to determine its effect on another variable under controlled conditions:

   a) Experiment, b) Case Study

   c) Survey, d) Observation

5) An event/condition which can be measured and which varies quantitatively

   a) Design, b) Variable

   c) Subject, d) Object

6) Which one of the following is not fulfill the conditions of the term Standardisation:

   a) Uniformity of scoring

   b) Reliability and validity of the test must be established

   c) Uniformity in instructions

   d) Items are modifiable not fixed

7) Which on of the characteristics is not essential for a psychological test?

   a) Objectivity, b) Reliability

   c) Norms, d) Subjectivity

8) Nature of the individual tests mostly is:

   a) Verbal, b) Non Verbal

   c) Performance, d) Non Verbal and Performance

9) In which type of psychological tests, there is interpersonal agreement among the experts in relation to scoring of the items:

   a) Objective test, b) Standardised test

   c) Subjective test, d) Power test

10) In which category Ravin's progressive matrix test falls:

   a) Non Verbal, b) Verbal

   c) Non language, d) Performance

2.4 EXTRANEOUS VARIABLES

Variables other than the independent variable may cause or account for differences in the dependent variable in both observational and experimental research. Such variables are called extraneous variables.

An extraneous variable is a factor / or stimulus other than the independent variable that could influence the dependent variable in such a way that it could explain the relationship observed between independent and dependent variables.

If the research question concerns the relationship between watching violent television and aggressiveness in preschool, any variable other than watching violent television (for example, an aggressive personality, the action rather than the violence component of the programs, etc.) might possibly account for differences in aggressiveness between the groups. These variables in the bracket are the extraneous variables. Random assignment, for example, is often used to minimize the effects of extraneous variables associated with the participants.

2.5 EXPERIMENTAL AND CONTROL GROUPS

In its simplest form, an experiment might have two groups of subjects, an experimental group and a control group. The experimental group receives the experimental manipulation or treatment of interest while the control or comparison group is treated in the same way as the experimental group but without the manipulation or treatment of interest.

2.5.1 Random Assignment of Participants to Groups

It is crucial in a true experiment for the participants in the sample to be randomly assigned to the different groups in the research design. Random means that before assignment every participant has an equal chance to be exposed to the different conditions created by the investigator. In other words participants must be assigned to the experimental and control groups on random basis. The goal of random assignment is to exclude or control all possible extraneous variables, so that the only difference obtained between the two groups should be attributable to the factor manipulated by the investigator. Random assignment reduces the likelihood that the results of experiment will be due to any preexisting differences. Random assignment is an unbiased method of assigning the participants to experimental and control conditions of an experimental.

Let us take an example. The problem to be studied is whether yogic exercises affect general health in the patients of coronary heart disease. In this study yogic exercise is the independent variable. The experimenter manipulated the amount of the yogic exercise by having the heart patients engaged in those exercises five times a week under the supervision of a trained instructor.

We need to have one group of heart patients engaged in yogic exercises and the other not engaged in yogic exercises. We randomly assign heart patients to these two groups and make observations of both the groups in the presence and absence of yogic exercises. The differences in their general health are then measured. These steps are shown in the table below.

		Experimental Group	Manipulation of Independent variable exercise	Measurement of dependent variable general health	Comparison of behaviours of control group and experimental group
Obtained subjects	Random assignment				
		Control group	No exercise	General health	

2.5.2 Designing the Experiment

After defining variables, the experimenter decides about levels of independent variable, specifies the dependent variables, collects the experimental materials, and prepares the procedure to be used. Thus a blue print of how the experiment will be conducted is finalized. The experimental conditions known as treatments are decided. The overall blueprint of the experiment is called experimental design. It contains the specification of the plan and structure of the experiment. For the sake of precision the variables and their measures are defined and specific instructions for the experimental conditions are clearly written. There are different kinds of designs in psychological studies which will be discussed in later pages.

Self Assessment Questions

True / False Type Questions

1) Experiment is a method in which the investigator do not manipulate the variables under control condition. T/F
2) Norms are standard to compare individual. T/F
3) Questionnaires are Standardised tests. T/F
4) The use of control group is to ensure causation. T/F
5) The chief limitation of an experiment is the artificial manipulation of variables. T/F
6) Sequence related variables are not controlled by balancing. T/F
7) Systematic differences between groups can not be reduced by random assessment. T/F
8) Matching is often used to control the effects of socio-economic status. T/F
9) Making variables constant during the experiment helps to control . T/F
10) A test is a Standardised and objective instrument. T/F

2.6 INTRODUCTION OF TEST

We have been subjected to various tests since our school days; hence we have preliminary idea about what a test means to us. A test is a measurement device or technique used to quantify behaviour or aid in the undertaking and prediction of behaviour. According to dictionary, test is defined as a series of questions on the basis of which some information is sought. In psychology, the meaning of test is something more than this.

Today, psychological tests represent a major contribution by psychologists. They are connected with assessment of almost all aspects of psychological functioning, namely; personality, intelligence, value, aptitude, attitudes, interest and creativity etc. According to Anastasi (1988) a psychological test is essentially an objective and Standardised measure of a sample of behaviour. Freeman (1955) has defined a psychological test as a Standardised instrument designed to measure objectively one or more aspect of a total personality by means of samples of performance on behaviour. According to Singh (2006), a psychological or educational test is a Standardised procedure to measure quantitatively or qualitatively one or more than one aspect of a trait by means of sample of verbal or non-verbal behaviour. According to McIntire and Miller (2007),

psychological tests are instruments that require the testee to perform some behaviour. According to Gregory (2004), a test refers to a Standardised procedure for sampling behaviour and describing it with categories of scores. In addition, most tests have norms or standards by which the result can be used to predict other more important behaviour. After analysing above definition, it appears that a test consists of series of items, on the basis of which some information is sought about one or more aspect of an individual or groups traits, abilities, motives, attitude, and so on. There are many types of behaviour. Overt behaviour is an individual's observable actively. Some psychological tests attempts to measure the extent to which someone might engage in or "emit "a particular overt behaviour. Other tests measure how much a person has previously engaged in some overt behaviour. Behaviour can be covert - that is, it takes place within an individual and cannot be directly observed. For example, your feelings and thoughts are types of covert behaviour. Some tests attempt to measure past or current behaviour. Psychological and educational tests, thus, measure past or current behaviour.

2.6.1 Characteristics of Good Psychological Test

After analysing the above definitions we can discuss the chief characteristics of a good psychological test:

Objectivity: a test must have the trait of objectivity i.e., it must be free from the subjective element so that there is complete interpersonal agreement among experts regarding the meaning of the items and scoring the test. By objectivity of items is meant that the items should be phrased in such a manner that they are interpretated in exactly the same way by all those who take the test. Objectivity of scoring means that the scoring method of the test should be a standard one so that complete uniformity can be maintained when the test is scored by different experts at different times.

Standardised Procedure: is an essential feature of any psychological test. A test is considered to be Standardised if the procedure for administering it is uniform from one examiner and setting to another. Standardisation depends to some extent upon competence of the examiner. This is ensured by outlining clear cut instructions for the administration of test in the test manual.

Sample of Behaviour: a test targets a well defined and finite behaviour or domain known as the sample of behaviour due to constraints involved in comprehensive testing. For example Wechsler Adult Intelligence Scale (WAIS) uses 35 carefully selected words to judge the vocabulary of testee.

Norms: refer to the average performance of a representative sample on a given test. Norms are statistical standards based on the scores of a large sample so that an individual's score may be compared with those of others in a defined group. A score on a psychological test is not an absolute score. It is relative to a normative group. A given score needs to be compared with the scores of the members of the normative group. For instance, the mean score may be used to indicate the norm. Another person's score may be interpreted in the context of group's average. There are four common types of norms; age norms, grade norms, percentile norms, and standard score norms. Norms help in interpretation of the scores. In the absence of norms no meaning can be added to the score obtained on the test.

Practicability: a test must also be practicable from the point of view of neither the time taken in its completion, length, scoring, etc. in other words the test should not be lengthy and the scoring method must not be difficult nor one which can only be done by highly specialised persons.

Reliability: A test must also be reliable. Synonyms for reliability is: dependability, stability, consistency, predictability, accuracy. Reliability means consistency of a test that makes it trustworthy. Stated simply, if a test yields similar results on different occasions then it is considered reliable. For instance if you administer a test of intelligence on a child and find him a genius and repeat the test after two months and the child is still scoring in the same category then the test will be considered as the reliable one.

Validity: A second key characteristic of a good test is validity – the test must really measure what it has been designed to measure. Validity is most often assessed by exploring how the test scores correspond to some criterion – that is some behaviour, personal accomplishment, or characteristics that reflects the attribute. The rest is design to gauge.

2.7 TYPES OF PSYCHOLOGICAL TEST

Typology of tests is a purely arbitrary determination (Gregory 2004). However, using different criteria, psychological tests can be classified in the following manner:

2.7.1 On the Basis of Mode of Administration

Tests have been classified on the basis of administrative conditions into two types: Individual Test and Group Test

Individual Test : Individual test is that test that are administered to one person at a time. Kohs Block Design test is an example of the individual test. They are often used in clinical evaluations. The problems with individual test are that they are time consuming, higher in cost, and is labour intensive.

Group Tests : These are primarily designed for mass testing that is, they can be administered to more than one individual at time. They are economical and time saving. For example, Army Alpha and Alpha Beta test.

2.7.2 On the Basis of the Nature and Contents of the Items

A test may be classified on the basis of the nature of the items or the contents used therein. Important types of the test on this criterion are:

i) *Verbal Test*: is one whose items emphasize reading, writing, and oral expression as the primary mode of communication. Herein, instructions are printed or written. These are read by the examinees and accordingly items are answered. Jalota group general intelligence test and Mehta group test of intelligence are some common examples. Verbal test are also called paper – pencil test because the examinee has to write on a piece of paper while answering the test items.

ii) *NonVerbal Test*: These are tests which emphasise but do not altogether eliminate the role of language by using symbolic materials like pictures, figures, and so on. Such test uses the language in instructions but in items they do not use language. Raven's progressive matrices are a good example of non verbal test.

iii) *Performance Test*: are those that require the examinees to perform a task rather than answer some questions. Such test prohibits the use of language in items. Occasionally oral language is used to give instruction or the instruction may also be given through gesture and pantomime.

iv) *Objective Test*: There is another classification according to the nature of test items, where test can be classified into objective type test in which the responses are of multiple choice types and essay type tests in which the responses are of long answer type.

2.7.3 On the Basis of Mode of Scoring

The test can be classified into self scored versus expert scored or hand scored versus machine scored test. In self-scored test the testee himself/herself can score his responses with the help of a scoring key while in the case of expert scored test, the test responses are scored by an expert person (generally the test administrator). Hand scored tests are test that are scored manually while machine scored tests are the tests that are scored with the help of a machine (computer aided) for example the optical mark recognition (OMR) sheet responses used for various educational and mass assessment.

2.7.4 On the Basis of Rate of Performance or Time Limit in Producing a Response

The test can be classified into speed test and power test. Speed test are timed tests that is they examine the subject's speed of responding within the stipulated period of time. Test items in a speed test are of uniform difficulty but time limit is such that no examinee can attempt all the items (Chadha 1996). A pure speed test is a test composed of items so easy that the subject never gives a wrong answer and his score is equal to number of questions attempted by him for example the clinical speed and accuracy test.

Power test, on the other hand, offers enough time for the subject to attempt all the questions.

A power test is one which has a generous time limit so that most examinees are able to attempt every item. Usually such tests have items which are generally arranged in increasing order of difficulties. In many intelligence tests there are certain items that are too difficult for anyone to solve; for example; Raven's progressive matrices (Raven and court 1998).

2.7.5 On the Basis of Criterion of Behavioural Attitude Measured

According to the behavioural attitudes assessed, tests can be classified into personality test, ability (intelligence, aptitude, achievement and creativity) tests and tests of attitudes, values and interest.

Personality Tests: These tests are designed to measure a person's individuality in terms of unique traits and behaviour. Personality test measures the traits qualities or behaviours that determine a person's individuality such test include checklists, inventories for example (16 PF, MMPI, Maudsley personality inventories) and projective techniques like the Rorschach Test, Thematic Apperception Test and so on.

Ability Tests: These are the qualities that enable an individual to do specific task at a specified time and can be classified into intelligence, aptitude, achievement, and creativity.

Intelligence Test: This measures an individual's ability in relativity global areas such as verbal comprehension, perceptual organisation or reasoning and thereby help determine potential for scholastic work or certain occupations. For example, Wechsler adult intelligence test (WAIS).

Aptitude Test: This test measures the capability for a relativity specific task or type of skill Aptitude test is in effect a narrow form of ability testing. Example of aptitude test are Seashore measures of musical talents (Seashore 1938), SAT (Scholastic Assessment test previously called as scholastic aptitude test).

Creativity Test: This test assesses the novel original thinking and the capacity to find unusual or unexpected solutions especially the vaguely defined problem. For example

Torrance test of creative thinking, thinking by E.Paul Torrance (1966) and creativity self report by Feldhusen (1965).

Achievement Test: This measures a person's degree of learning, success, or accomplishment in a subject of task. For example test of achievement and profiency (TAP 1996), lowa test of basic skill (1992).

Apart from these, tests can be also classified on the basis of behavioural dimensions that are attitude test, values test, interest test and neuropsychological test and so on.

Attitude Tests: These tests refer to our evaluations about various aspects of the world and tests of attitude measure a person's tendency to evaluate – favorably or unfavorably – a class of events, objects or persons. Examples of attitude tests are criminal attitude test (CATS), (Taylor 1968); Attitude towards Retarded (Efron and Efron1967).

Values Test: These tests refer to the normative frameworks related to individual / group behaviour or expectations. Examples of value test are Allport, Vernon and Lindzey test of values.

Interest Tests: These tests measure an individual's preference for certain activities or topics and thereby help determine occupational choice. For example strong interest inventories (1927) , vocational preference battery (Holland).

Neuropsychological Tests: These measure cognitive, sensory, perceptual and motor performance to determine the extant, locus, and behavioural consequences of brain damage. For example louria Nebraska neuropsychological batteries (1989), Bender visual motor gestalt test (1938).

Self Assessment Questions

1) What are the different types of psychological tests?

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2) What are the criteria on the basis of which tests are classified?

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2.8 USES OF PSYCHOLOGICAL TESTS

Tests are used for many purposes which are indicated below:

1) They are used for screening the normals from the abnormal.

2) They are used for testing the intelligence, aptitude and interest of the individuals

3) Psychological tests of creativity are used for delineating the creative potentials of a person.

4) Tests are also used for occupational and vocational counselling.

5) Psychological tests give an idea about the mental status of an individual.

6) Tests are of great use in understanding the personalities of individuals which includes, children, adolescents, adults and even older persons.

7) Diagnostic tests are used to ascertain if an individual suffers fromcertain mental disorders and if so exactly what disorders.

8) Tests are used for recruitment, selection, training and placement in the industrial setting.

9) Tests are of great value in psychological research.

10) It helps identify people with specially required qualities, such as leadership quality etc.

2.9 LET US SUM UP

Experiments are tightly controlled manipulations that allow the researcher to determine cause and affect relationship. This is done under the controlled condition the experimenter controls the relevant variables with the help of the techniques like randomization, matching, elimination, counterbalancing, and constancy of the condition the participant in an experiment are randomly assign to two groups i.e. experimental group and controlled group. Those receiving the treatment of independent variable constitute experimental growth and the group receiving no such treatment is called the controlled group.

Psychologist uses a psychological test. In order to collect the relevant data and information to answer the research questions and to solve problem. A test is a Standardised procedure for sampling behaviour and describing it with categories or scores. A good test must be reliable and have norms for interpreting the score of an individual. Tests are classified on the basis of mode of administration, scoring, rate of performance, nature of items and behavioural attitudes.

2.10 UNIT END QUESTIONS

1) What is experiment? What are the main features of experiment?

2) What are the main types of variables? Give examples of each type of variables?

3) Explain the uses of control?

4) What are the main techniques of control?

5) What is the importance of randomization in experiment?

6) Define test and what are the key characteristics of psychological test?

7) Distinguish between Individual and Group test with examples?

8) Differentiate between ability test and personality test?

9) What are the key denominators of psychological test?

10) Enlist the uses of psychological test?

2.11 GLOSSARY

Experiment : A series of observations conducted under controlled conditions to investigate the functional relationship between selected variables.

Independent Variable : The event or situation that is manipulated by an experimenter to see if it will have a predicted effect on some other event or situation.

Dependent Variable : Variable in an experiment that represents the measurable response or behaviour of the subjects in the experiment.

Random Assignment : process of assigning subjects to the experimental or control groups randomly. so that each subject has an equal chance of being in either group.

Experimental Group : subjects in an experiment who are subjected to the independent variables.

Control Group : subjects in an experiment who are not subjected to the independent variable and who may receive a placebo treatment.

Control : holding constant the effect of extraneous variable.

Manipulation : deliberate or active change introduced by the experimenter is an event to see the effect on behaviour. It involves arranging for the appearance of different values of a variable

Test : An objective and Standardised measure of a sample of behaviour.

Reliability : A statement about degree of consistency of a measurement technique. Reliable technique yields similar measures upon repeated measurements under similar conditions.

Validity : it refers to the extent to which the test measures what it purports to measures.

Standardisation : A method of establishing norms or standards and uniform procedures for a test by administering it to a large group of representative individuals.

Norms : are statistical standards based on the scores of a large sample.

Answers: (1)D, (2)B, (3)D, (4)A, (5)B, (6)D, (7)D, (8)D, (9)A, (10)A

Answers: (1) F, (2) T, (3) F, (4) T, (5) T, (6) F, (7) F, (8) T, (9) T, (10)T

2.12 SUGGESTED READINGS

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UNIT 3 STEPS IN RESEARCH

Structure

3.0 Introduction

3.1 Objectives

3.2 Research Process

- 3.2.1 Identification of the Problem
- 3.2.2 View of Literature
- 3.2.3 Formulating a Hypothesis
- 3.2.4 Identifying, Manipulating and Controlling Variables
- 3.2.5 Formulating a Research Design
- 3.2.6 Constructing Devices for Observation and Measurement
- 3.2.7 Sample Selection and Data Collection
- 3.2.8 Data Analysis and Interpretation

3.3 Hypothesis Testing

3.4 Drawing Conclusion

3.5 Preparation of Report and Publication

3.6 Let Us Sum Up

3.7 Unit End Questions

3.8 Suggested Readings

3.0 INTRODUCTION

Research process is similar to undertaking a journey with specific mission. Before starting the journey we decide where you want to go and which route to follow. If the route is known to you don't need anybody guidance but if there are more than one route towards destination than you have to decide which route is most suitable to reach the destination. Now you look upon the research process in this context. Your first decision would be 'what you want to find out about 'or in other words what research question to be answered to. After deciding the research question or problem you should now decide 'how to go about finding there answers'. Therefore precisely the path to finding answers to research questions constitutes research methodology. In research process you passed through some practical steps in order to find out the answers of research questions. This unit will familiarize you with important steps needed for conducting a research. You will provide a quick glance at the whole process of research to acquaint you with the various tasks you faced to undertake to carry out your research / study. It will give you some idea of what the research journey involved. Finally this unit will cover the total spectrum of research and endeavor starting from the problem through to writing a research report and publication.

3.1 OBJECTIVES

After reading this unit, you will be able to:

- Identify the various steps needed for conducting a research;
- Explain the whole process of research in simple manner;

- Discuss how theoretical knowledge can be further applied to undertake a research; and
- Analyse the importance of each steps involved in research process.

3.2 RESEARCH PROCESS

The goal of the research is to find the truth and to use a scientific method that results in a reasonable and sound answers to important questions that will further our understanding of human behaviour. Research process consists of series of actions and steps needed for conducting scientific research. If the researcher follows certain steps in conducting the research, the work can be carried smoothly with least difficulty. The proposed flow chart given below illustrates the research process:

The research process consists of a number of closely related activities as shown through step I to step X, but such activities overlap continuously rather than following strictly prescribed sequence. The order of various steps shown provides a useful procedural guidelines regarding research process. Details of each of the research stages is given underneath.

3.2.1 Identification of the Problem

The first and most important step for identifying a problem is asking a question or identifying a need that arises as a result of curiosity and to which it becomes necessary to find an answer. The psychological studies are focused on one or many of the following kinds of questions:

- What are the events that cause or determine a given behaviour or response?
- What is the nature of behaviour or action (i.e., its structure) and how it is linked with other actions and behaviours?
- What are the relationships of internal psychological processes with behavioural phenomenon?

The research question determines the direction of the study. The researchers have to struggle a lot in identifying and articulating the same. Essentially two steps are involved in formulating the research problem, viz. understanding the problem thoroughly, and rephrasing the same into meaningful terms from an analytical point of view. The main function of formulating a research problem is to decide what you want to find out about.

It is extremely important to evaluate the research problem in the light of:

a) Financial resources at your disposal.

b) The time available with you and your research supervisor.

c) The supervisor's expertise and knowledge in the field of study.

d) Your own expertise and knowledge.

e) Whether you have sufficient knowledge about computers and software if you plan to use them.

It is equally important to identify any gaps in your knowledge of relevant disciplines, such as statistics required for analysis.

3.2.2 Review of Literature

For identifying a good solvable problem, the investigator undertakes the review of literature**.** A body of prior work related to a research problem is referred to as literature. Scientific research includes a review of the relevant literature. When a researcher reviews the previous researches in related fields, he becomes familiar with several known and unknown phenomena. Therefore one obvious advantage of review of the literature is that it helps to eliminate duplication of what has already been done and provides guidance and suggestions for further research. The main purpose of review of the literature is fourfold:

a) It gives an idea about the variables which have been found to be conceptually and practically important and unimportant in the related field. Thus the review of literature helps in discovering and selecting variables relevant for the given study.

b) The literature provides an estimate of the previous work and provides an opportunity for the meaningful extension of the previous work.

c) A review of literature helps the researcher in systematically compiling the expanding and growing body of knowledge.

d) Review also facilitates in drawing useful conclusions regarding the variables under study and provides a meaningful way of their subsequent applications.

e) A review of the literature also helps in redefining the variables and determining the meanings and relationships among them so that the researcher can build up a case as well as a context for further investigation that has merit and applicability.

There are different sources of review of literature such as journals, books, abstracts, indexes and periodicals. If you are unsure about what journals and other resources to examine for research idea you should know that the computer search engine **PsycINFO** is a very effective tool for going through the technical literature. The print companion to **PsycINFO is psychological abstracts** and both of theses contain abstracts of articles from almost all journals that publish psychological research. If you find an abstract of interest, you can then read the entire article for additional information.

Self Assessment Questions

Indicate whether True / False

1) The first step of research process is identifying a problem. T/F
2) Hypothesis are formed after formulating a research design. T/F
3) Preparation of report and publications of research study allow the other researchers to replicate the study. T/F
4) Operational definitions of the variables is not necessary for the purpose of measurement. T/F
5) Selection of particular data collection depends on the nature of study. T/F

3.2.3 Formulating a Hypothesis

When the researcher has identified the problem and reviewed the relevant literature he formulates a hypothesis. From a careful examination of relevant theory and previous findings, the psychologist would be able to state one or more prepositions whose validity could be tested. Ideally these hypotheses would be based on a deductive theory but they may simply be new hypotheses or hypothesis based on previous research findings.

Hypothesis may be defined as a tentative statement showing a relationship between variables under study. It is stated in the form of a declarative sentence. For instance suppose you are interested to know the effect of reward on learning. You have analysed the past research and found the indication that the two variables are positively related. You need to convert this idea in terms of a testable statement. At this point you may develop the following hypothesis.

Those who are rewarded shall require lesser number of trials to learn the lesson than those who are not rewarded.

Hypothesis plays the key role in formulating and guiding any study. The hypotheses are generally derived from earlier research findings, existing theories, and personal observations and experiences. For unbiased research, the researcher must formulate in advance of the data gathering process. No hypothesis should be formulated after the data are collected.

3.2.4 Identifying, Manipulating and Controlling Variables

While talking about the hypothesis you will encounter the word, ' variable' in the scientific literature in psychology. Variables are defined as those characteristics which are manipulated, controlled and observed by the experimenter.

At least three types of variables must be recognised at the outset – the dependent variable, the independent variable and the extraneous variable. The dependent variable is one about which the prediction is made on the basis of the experiment. In other words the dependent variable is the characteristics or condition that changes as the experimenter changes the independent variables. The independent variable is that condition or characteristics which is manipulated or selected by the experimenter is order to find out its relationship to some observed phenomena. An extraneous variable is the uncontrolled variable that may affect the dependent variable.

The experimenter is not interested in the changes, produced due to the extraneous variable and hence, he tries to control it as far as practicable. The extraneous variable is known as the relevant variable. In order to make a variable clear, precise and easy to communicate it is important that it is operationally defined. An operational definition involves specifying the actual operations that defines a given variable. Operational definition is also important for the purpose of measurement. Since psychological variables are complex and their measurement poses special problems, psychologists use operational definitions. They frequently use report (verbal) measures, behavioural measures and psychological measures of variables in their studies, which help him or her to specify the operations and may allow quantification.

3.2.5 Formulating a Research Design

A research design may be regarded as the blueprint of those procedures which are adapted by the researcher for testing the relationship between the dependent variable and the independent variable. There are several kinds of experimental designs and the selection of any one is based upon the purpose of the research, types of variables to be controlled and manipulated as well as upon the conditions under which the experiment is to be conducted. The main purpose of experimental design is to help the researcher in manipulating the independent variables freely and to provide maximum control of the extraneous variables so that it may be said with all certainty that the experimental change is due to only the manipulation of the experimental variable. The main function of a research design is to explain how you will find answers to your research questions. The research design sets out the logic of your inquiry. It includes the study design and the

logistical arrangements that you propose to undertake as well as the measurement procedures. It includes also the sampling strategy, the frame of analysis and the time frame. For any investigation the selection of an appropriate research design is crucial to enable the researcher to arrive at valid findings, comparisons and conclusions.

Self Assessment Questions

1) Delineate the process by which you will formulate your hypothesis in regard to a research study. Provide appropriate examples.

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2) What is a research design? How is it formulated and what are its uses?

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3) What is meant by manipulating the independent variable, controlling the extraneous variable and avoiding the error variance?

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3.2.6 Constructing Devices for Observation and Measurement

When the research design has been formulated the next step is to construct or collect and choose appropriate tools of research for scientific observation and measurement. Depending on the nature of research problem a researcher may choose particular method (e.g. observation, experiment, case study, correlation, and survey). If readymade tools are not available then the researcher may have to develop appropriate tools before undertaking the study. All these tools of research are the many methods through which data are collected by asking for information from person rather than observing them.

3.2.7 Sample Selection and Data Collection

After deciding the tools for the study the research one must also decide about the participants of the study for which purpose usually a small sample is drawn which represents the population. Then the actual study proceeds. Observations are made of the variables of interest, which involves an experiment in which all variables are carefully controlled. Field study or a field experiment or survey may be conducted. Whatever method is selected, the point is that the investigator is observing the variables of interest.

3.2.8 Data Analysis and Interpretation

After making observation the data collected are analysed with the help of various quantitative and qualitative statistical techniques. Careful scrutiny of the data is a critical aspect of scientific method. The purpose of the analysis is to make sense of the data and see what light they throw on the problem and the hypotheses of the study.

3.3 HYPOTHESIS TESTING

After analysing data, the researcher is in a position to test the hypothesis. Do the facts support hypotheses, or they happen to be contrary. This is the usual question which should be answered while testing hypotheses. Various parametric and non-parametric tests have been developed for this purpose. The hypothesis may be tested through the use of one or more of such tests, depending upon the nature and object of research inquiry. Hypothesis testing will result in either accepting or in rejecting it.

3.4 DRAWING CONCLUSIONS

The investigator after analysing the result draws some conclusions. In fact the investigator wants to make some statement about the research problem which he or she could not make without conducting the research. It is during this phase that the hypotheses are accepted or rejected. At the same time the conclusions of the study are related to the theory or research findings from which the hypotheses originally came. Depending on the new findings the original theory may have to be modified.

3.5 PREPARATION OF REPORT AND PUBLICATION

This is the last step in most of the research studies. The researcher documents all the steps of his or her research in clear terms. This report informs the reader about what the researcher has done, wht has been discovered and what conclusion the researcher has drawn from findings. If the researcher is clear about the whole process the person will also be clear about the way he or she wants to write the report. This helps the reader to understand the study and use it for various purposes. It allows one to replicate the study. The publications of study in scientific journals or books make the work available for wider dissemination.

Self Assessment Questions

1) What does sample selection involve?

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2) What is meant by data collection?

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3) What are the steps involved in data analysis and interpretation?

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4) Define Hypothesis testing.

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3.6 LET US SUM UP

This unit has provided an overview of the research process. The steps of research process includes problem identification, formulation of hypothesis, identification manipulation and controlling of the variable, formulation of research design, constructing devices for observation, sample selection and data collection, data analysis and interpretation, drawing conclusions and preparation of report and publications. The nine steps cover total spectrum of the research endeavor. The steps are in operation following a logical sequence and detailing the various methods and procedures in a simple step – by – step procedure.

3.7 UNIT END QUESTIONS

1) Enlist the steps involved in research process?

2) Explain the importance of research questions in psychological research?

3) What is the role of review of literature in research process?

4) Why formulates of hypothesis is necessary while conducting it?

5) How the steps in the research process do helps a person to get knowledge?

3.8 SUGGESTED READINGS

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UNIT 4 TYPES OF RESEARCH AND METHODS OF RESEARCH

Structure

4.0 Introduction

4.1 Objectives

4.2 Types of Research

4.3 Non-Experimental Research
- 4.3.1 Historical Research
- 4.3.2 Descriptive Research
- 4.3.3 Correlational Research
- 4.3.4 Qualitative Research
- 4.3.5 Ex-post-facto Research

4.4 Experimental Research
- 4.4.1 True Experimental Research
- 4.4.2 Quasi Experimental Research

4.5 Methods of Research
- 4.5.1 Non-Experimental Methods
  - 4.5.1.1 Naturalistic Observation
  - 4.5.1.2 Archival Research
  - 4.5.1.3 Content Analysis
- 4.5.2 Surveys
- 4.5.3 Field Studies
- 4.5.4 Case Studies

4.6 Experimental Methods
- 4.6.1 Laboratory Experiments
- 4.6.2 Field Experiment

4.7 Let Us Sum Up

4.8 Unit End Questions

4.9 Glossary

4.10 Suggested Readings

4.0 INTRODUCTION

Now you have a good idea about what research is, what are the bases for the conduction and experiment in tests, and how research process works? Now, it is time to turn to another related issue; how do psychologists actually perform the task of adding to our knowledge of human behaviour? There are a number of ways to investigate into the answer of research questions. The kind of methods researchers use depends on kind of questions they want to answer. This unit begins with discussion of two types of researches i.e. non-experimental researches and experimental researches. Non-experimental researches will cover various kinds of researches along with examples, namely; historical research, correlation research, qualitative research and *expost facto* researches. Further, you will learn about experimental researches which are conducted to establish the cause

and effect relationship. This is followed by the details of main types of experimental researches i.e. true experimental researches and quasi experimental researches. Then, you will learn how true experimental researches differ from quasi experimental researches.

We now need to enquire into various methods of psychological researches for obtaining data that may be used to arrive at an evidence report. Various kind of non-experimental methods which are used to answer the questions, such as naturalistic observation, survey method, case study, content analysis, field studies are described. Finally, besides non-experimental methods, this unit will explain you the experimental methods i.e. laboratory experiment and field experiment.

4.1 OBJECTIVES

After reading this unit, you will be able to:

- Explain the types of researches;
- Differentiate between experimental and non-experimental researches;
- Explain true experimental researches and quasi experimental researches;
- Describe advantages and disadvantages of each method which are used in psychological research;
- Differentiate laboratory experiments from field experiments;
- Explain the differences between basic and applied researches; and
- Identify experimental and non experimental researches and methods.

4.2 TYPES OF RESEARCH

The types of research differ mostly on three dimensions:

1) the nature of the question asked;

2) the method used to answer it; and

3) the degree of precision the method brings to answering the questions.

One way in which these methods do not necessarily differ, however is in the content or the focus of the research. In other words, if you are interested in the effects of television viewing in children, your research can be non-experimental, wherein you survey watching habits. If experimental, you may expose children models to the TV and one group non viewing of TV and look at the effect of the exposure on their behaviour.

The most general way of classifying research is to divide it into fundamental or pure or basic research and applied research. A fundamental research is the formal and systematic process where the researcher aims to develop a theory or a model by identifying all the important variables in a situation and by discovering broad generalisations and principles about those variables. It utilizes a careful sample so that its conclusion can be generalised beyond the immediate situation. For example biological psychologists explore the links between brain and mind; developmental psychology studies our changing abilities from womb to tomb and the personality psychologists investigate our inner traits.

Applied research, as its name implies, applies the theory or model developed through the fundamental research to the actual solution of the problems. Applied research tackles practical problems, as for example, industrial/ organisational psychologists study and

advise on behaviour in the workplace. They use psychology concepts and methods to help organisations select and train employees. They boost morale of the employees and also their productivity. They design products and answer people's responses to them.

Besides the fundamental research and the applied research another type of research has recently been popular in the fields of social psychology, industrial psychology, and education. This is known as 'action research'.

In action research the researcher emphasises a problem which is immediate, urgent and has local applicability. Thus, the researcher here focuses upon the immediate consequences and applications of a problem and not upon general or universal application nor upon the development of a theory or a model. A teacher may undertake a research to know the reasons underlying unhealthy class-room habits so that immediate outcome may benefit the local class- room students. There are number of researches, given hereunder:

Types of research

Types of research →	
↓	↓
Non-experimental	Experimental
↓	↓
Historical, Descriptive, Correlational, Qualitative , Expost facto	True experimental, Quasi experimental

The above table is being explained below:

4.3 NON-EXPERIMENTAL RESEARCH

A non experimental research is one where independent variables can not be manipulated. The researcher does not have complete control over the conditions of the non experimental research studies. For example, if you want to survey the television-watching behaviour of adolescents, you could do so by having them maintain a diary in which they record what shows they watch and with whom. This descriptive study provides information about their television-watching habits but says nothing about why they watch what they do. You are not in any way trying to have an impact on their television watching behaviour or investigate why they might watch particular shows. This is non-experimental in nature because no cause-and-effect relationships of any type are being hypothesized or investigated. Nonexperimental or descriptive research describes the characterististics of an existing phenomenon. Census of any contrary, current unemployment rate of working single parents who have children under age 5 etc. are the examples of descriptive research. A second characteristic of non-experimental is that the data collection procedure often must forfeit some degree of control in return for obtaining the data. For example the researcher may decide to study public records that may be almost, but not exactly in the form we desire or researcher may have to keep a questionnaire start to help gain the cooperation of subjects.

4.3.1 Historical Research

Historical research relates past events to one another or to current events. Basically, historical research (or historiography) answers the question: what is the nature of events that have happened in the past? For example, one might want to examine trends in treatment of mental illness or how attitudes toward work and families have changed. All of these questions require the detective work of a historian, finding and collecting relevant data and then, just as with any other research endeavour, testing a hypothesis. In fact,

like any other researcher, the historian collects data, analyses them, and then comes to conclusions about the tenability of the hypothesis. One significant difference between historical research and other types of research is the type of data collected and the method of collection.

Researchers who do historical research often accomplish this goal through the use of primary sources (original documents or information from people who have personally experienced an event) and secondary sources (second hand documents or information from people who may have some knowledge about the event but did not experience it first hand). Even if these sources are readily available, however, one of the greatest challenges doing such research is in knowing how much faith the researcher can put on the accuracy of the sources.

Examining the trends in achievement level of Indian children compared with American children is an example of historical research.

4.3.2 Descriptive Research

Descriptive research describes and interprets what is. It is concerned with conditions or relationships that exist, the practices that prevail, the beliefs or attitudes that are held, the processes that are going on; effects that are being felt or trends that are developments. The approach is directed towards identifying various characteristics of research problems and to create observations conducive to further research. Descriptive research describes characteristics of an existing phenomenon. Descriptive research provides a broad picture of a phenomenon you might be interested in exploring. Current employment rates, census of any country, number of working single parents are examples of descriptive research.

4.3.3 Correlational Research

Descriptive and historical research provides a picture of events that are currently happening or have occurred in the past. Researchers often want to go beyond mere description and begin discussing the relationship that certain events might have to one another. The most likely type of research to answer questions about the relationship among variables or events is called correlational events. Correlational research provides some indication as to how two or more things are related to one another or, in effect what they share or have in common or how well a specific outcome might be predicted by one or more pieces of information. Correlational research uses a numerical index called the correlation coefficient as a measure of the strength of this relationship. For example, if you are interested to find out the relationship between the number of hours spent in studying and their achievement, then you would be doing correlational research, because you are interested in the relationship between these two variables. If you are interested in finding out the best predictors of success in a school you would be doing a type of correlational research that includes prediction.

One of the most important points about correlational research is that it examines relationships between variables but in no way implies that one causes changes in the other. In other words, correlation and prediction examine associations but not causal relationships, wherein a change in one factor directly influences a change in another.

4.3.4 Qualitative Research

The general purpose of qualitative research methods is to examine human behaviour in the social, cultural, and political contexts in which they occur. This is done through a variety of tools, such as interviews, historical methods, case studies, and ethnography

and usually results in qualitative (or non-numeric) primary data. In other words, the qualitative researcher is more (but not only) interested in the contents of an interviewee's speech than in the number of times (frequency) a particular comment is made.

Qualitative research is relatively new to the social and behavioural sciences and, to a large extent its increasing popularity is due to a degree of dissatisfaction with other available research methods. Some scientists feel that the traditional experimental model is just too restrictive and narrow, preventing underlying and important factors and relationships from being revealed. But what's so valuable about this set of tools is that it allows you to answer a whole new set of questions in a whole new way.

Qualitative research is the interpretive study of a specific issue or a problem in which the researcher is central to the research process. It's a naturalistic inquiry, which unfolds in a non-manipulative fashion. It lacks the predetermined constraints on outcome variables. Qualitative methods yield data in the form of words than numbers. Qualitative studies provide rich description and explanation of processes in specific local contexts. They provide a feel of the processes by focusing on the chronological flow or sequence of events leading to certain outcomes or consequences. The whole phenomenon is studied with a strategy of a detailed or elaborate (thick) description. Throughout the conduct of qualitative study interpretation and reflection on the part of researcher is required.

Qualitative data can come from a variety of sources and can take a variety of forms. The data may be used as a supplement to quantitative data or may be used in their own right. Qualitative data can be obtained through a variety of methods such as case studies, interviews, discourse analysis, narratives, and ethnography and participant observation.

4.3.5 Ex-Post Facto Research

In this kind of research, the independent variable or variables have already occurred in which the researcher starts with observation of a dependent variable or variables. He then studies the independent variables in retrospect for their possible relations to and effects on the dependent variable or variables. The most important difference between experimental research and ex-post facto research is control. In the former, the investigator has a manipulative control on the independent variable, whereas in the latter this control is not possible, more than this, randomization is not possible. In the ex-post facto research, the researcher must take things as they are and try to collect data and analyse them in that context.

In an ideal social scientific research, the possibility of finding random samples of subjects and randomly assigning them to groups and treatment to group would always be possible. However, these possibilities do not exist in the real situation. The ex-post facto research could be of a large scale or a small scale. This type of research has three weaknesses:

1) the inability to manipulate the independent variables,

2) lack of power to randomize, and

3) the risk of improper interpretation.

In other words, compared to experimental research, other things being equal, ex-post facto research lacks control. This lack is a basis for the third weakness: the risk of improper interpretation. Therefore, committing unequivocally to experimentation or to ex-post facto research may be poor policy; Ex-post facto research may not have particular hypothesis as a predicted relationship may be quite spurious. Therefore, ex-

post facto research that is conducted without hypothesis, without predictions, research in which data are just collected and then interpreted is even more dangerous in its power to mislead.

Self Assessment Questions

Multiple Choice Questions

1) In a naturalistic observation , the phenomenon in which the behaviour of the subjects being observed changes because they are being watched is called:

   a) Observer Bias b) Participant Observation

   c) Observer Effect d) Representative Sampling

2) The main disadvantage of a case study is that it is not easily done due to the large number of subjects detailed enough for most research questions generalizable to other similar conditions biased.

3) Fields experiments are concerned with:

   a) casual relationships

   b) direction of relationships

   c) natural setting

   d) all of these

4) Results are obtained under artificial conditions is a limitation of method:

   a) observational

   b) clinical

   c) experimental

   d) none

5) Which one is not the limitation of laboratory experiment:

   a) artificial environment

   b) lack of internal validity

   c) study of all variables not possible

   d) extraneous factors

6) Which one is not a non-experimental research

   a) field study

   b) field experiment

   c) case study

   d) survey

7) Directly asking a sample of people questions about their behaviour is:

   a) observation

b) survey

c) case experiment

d) experiment

8) Which method examines existing records to confirm hypothesis:

a) survey

b) archival research

c) case study

d) experiment

9) The investigator simply observes and records what happens in the natural environment in the:

a) naturalistic observation

b) the survey method

c) the clinical approach

d) experimental method

10) Results of which methods cannot be generalise to the population at large:

a) survey

b) experiment

c) case study

d) field study

4.4 EXPERIMENTAL RESEARCH

You already know that correlational research can help to establish the presence of a relationship among variables but does not provide any reason to believe that variables are causally related to one another. How does one find out if characteristics, behaviour, or events are related in such a way that the relationship is causal one? There are two types of research that can answer that question: true experimental research and quasi-experimental research.

4.4.1 True Experimental Research

In true experimental research, participants are assigned to groups based on some criterion, often called the treatment variable or treatment condition. For example, you want to compare effects of two different techniques for reducing obsessive-compulsive disorder behaviour in adults. The first technique includes behavioural therapy and the second does not. Once adults are assigned to groups and the programs are completed, you will want to look for any differences between the two groups with regard to the effects of the therapy on the number of obsessive-compulsive behaviours. Because assignment to the groups is determined by the researcher, the researcher has given assignment to the groups as determined by the researcher, and thus the researcher has complete control over the factors to which the adults are exposed. This is the ideal model for establishing a cause and effect relationship because the researcher has clearly

defined the possible cause and can keep very close tabs on what is happening. Most important, however is that the researcher has complete control over the treatment.

4.4.2 Quasi-Experimental Research

In quasi-experimental study, the researcher does not have a such a high degree of control because people have already been indirectly assigned to those groups (e.g., social class, type of abuse, gender, type of injury) for which you are testing the effects. In these researches participants are preassigned to groups based on some pre-determined characteristics or quality. Differences in gender, race, age, grade in school, neighborhood of residence, type of job, and even experiences are examples. These groups assignments have already taken place before the experiment begins, and the researcher has no control as to who is assigned to each groups.

The most important use of the quasi experimental method occurs where researchers cannot, in good conscience, assign people to groups and test the effects of group membership on some other outcome. For example, researchers who are interested in the effects of parental unemployment on children could not very well encourage mothers or fathers to quit work. Rather, they would seek out families where parents are already unemployed and then conduct the research.

Quasi-experimental research is also called post hoc, or after-the-fact, research because the actual research takes place after the assignment of groups (e.g., employed versus unemployed, malnourished versus non malnourished, male versus female). Because assignment has already taken place, the researcher has a high degree, but not the highest degree, of control over the cause of whatever effects are being examined. For the highest degree of control to occur, the true experimental model needs to be followed.

4.5 METHODS OF RESEARCH

Methods of research can be classified into two categories: Non-experimental methods and experimental methods

4.5.1 Non-Experimental Methods

4.5.1.1 Naturalistic Observation

Sometimes all researchers need to know is what is happening to a group of animals or people. The best way to look at his behaviour of animals or people is to watch them behave in their normal environment. In naturalistic observation a scientist observes behaviour in real world settings and makes no effort to manipulate or control the situation. Researchers conduct naturalistic observation at homes, day-care centers and so on. For example, if someone wanted to know how adolescents behave with members of the opposite sex in a social setting the researcher might go the mall on a weekend night.

The most important advantage of naturalistic observation is that it allows researchers to get a realistic picture of how behaviour occurs because they are actually watching that behaviour. In many cases animals or people who know they are being watched will not behave normally anyway in a process called the observer effect so often the observer needs to remain hidden from view. In these cases researcher might use one way mirror, or they might actually become participant in the group. This technique is called participant observation.

One of the major disadvantages of the naturalistic observation is the possibility of observer bias. That happens when the person doing the observing has a particular opinion about

what he or she is going to see or expects to see. Sometimes that person sees only those actions that supports that expectation and ignores actions that don't fit.

Another disadvantage is that each naturalistic setting is unique and unlike any other. Observations that are made at one time in one setting may not hold true for another time even if the setting is similar because the conditions are not going to be exactly the same time after time, researchers don't have that kind of control over the natural world.

4.5.1.2 Archival Research

In this method the researchers do not actually collect data themselves but they obtain data from public records, archives and so on. The researches merely analyses the data attempts to draw certain conclusions from them. The method can be valuable in many respects. For instance there is no other way to collect data on suicides and homicides.

Archival Data are those that are present in existing records or archives. The researcher simply examines or selects the data for analysis. Archival research may already exist or logistics or ethics may make it infeasible to conduct an experiment relating the variables of interest.

Archival research has limitations; First most archival data are collected for naturalistic reasons. Governments are private agencies collect the data for their own purpose and such data often do not suit the purposes of the scientist. Second because archival research is by nature carried out after the fact ruling out alternative hypotheses for particular observed correlations may be difficult. A researcher who relies on archival data is at the mercy of any biases that may have occurred in collecting the data. Police records are notoriously subject to bias. Many categories of crime are seldom reported to the police.

4.5.1.3 Content Analysis

Content analysis sometimes known as document analysis is a method of systematic, examination of communications or of current records or documents. Instead of questioning respondents according to some scale items or observing their behaviour directly the content – analyser takes the communications or documents prepared by the respondents and systematically find out the frequency or proportion of their appearances.

In content or documents analysis the primary sources of data are: letters, autobiographies, diaries, compositions, records, reports, printed forms, themes or other academic work, books, periodicals, bulletins or catalogues, syllabus, court decisions, pictures, films, cartoons etc. It is the obligation of the researchers to establish the trustworthiness of these data that have been drawn. Content analysis can also be used with responses of projective test with all kinds of verbal materials and with materials specially produced for research problems.

Merits and Demerits

- First content analysis is applicable to a wide variety of materials such as creativity, attitude, and ethnocentrisms, stereotypes, curriculum changes values, interest, religiosity, college budgets etc.
- Second content analysis can also be used to examine the effect of experimental manipulation upon the dependent variables. If the investigator wants to study the effect of practice upon the improvement of handwriting of children, content analysis may be of no less importance than any experimental design.

- Third content analysis is also used to validate other methods of observation. Suppose one wants to validate a self-discloure inventory. It is expected that people in general would not like to give personal information against which the test can be validated. But subjects can be asked some projective-type of questions and the responses can be content-analysed. Subsequently the test can be validated against the content- analysed response.
- Despite these merits content analysis should be used with caution because of the complexities involved.

4.5.2 Surveys

Survey methods are widely used gathering scientific information. It involves collection of data by asking questions and recording people's answers to them. They are used for various purposes on frequent goal of this kind of research is to estimate population characteristics. For example the goal of survey might be to determine the percentage of people who hold supporting of opposing positions on particular social issues, such as provision of reservation for women in job. The census and public opinion done by various agencies are good examples of surveys.

Surveys can also be used to test hypotheses about the relationships among variable. One may try to find out the effect of some event on people's behaviour. For example surveys have been conducted after the earth quack at Bhuj in Gujarat to find out the impact of earthquake on people's lives.

In undertaking surveys the researcher defines the study population and draws the sample. The sample must be representative of the population. Researcher use different procedures of sampling. They can use random sampling in which every member of the population has a equal and independent chance of being included in the sample. Usually the researcher use stratified random sampling in which two or more sub samples are represented according to some predetermined proportion as they exist in the population. Some times groups are selected by using clusters or groupings from a larger population. This is known as cluster sampling. The sample size is also determined because the ability to generalise depends on the sample size used in the survey.

Depending upon the ways of collecting data survey methods can be classified into different categories namely personal interview, mail questionnaire, telephone survey, internet survey, web survey, etc.

Advantages:

- Survey methods have wide scope. In other words through survey method a great deal of information can be obtained by studying the larger population
- It is more accurate. As Kerlinger (1986) has put it." The accuracy of properly drawn samples is frequently surprising, even to experts in the field. A sample of 600 to 700 individuals or families can give a remarkably accurate portrait of a community its values attitudes and beliefs.
- Survey methods has been frequently used in almost all the social sciences. Hence the method has inter-disciplinary value. In fact such researches provide raw materials for a vast increasing " gross disciplinary research" (Cambell & Katona,1953).
- Survey method is considered a very important and indispensable tool for studying social attitudes, beliefs, values etc. with accuracy at the economic rate.

Disadvantages:

- Survey methods remains at the surface and it does not penetrate into the depth of the problem being investigated.
- Survey method are time consuming, and demand a good amount of expenditure.
- Although it is true that survey research is accurate, it is still subject to sampling errors. In survey research there is always the probability of one chances in a twenty or hundred with an error, more serious than minor fluctuation of a chance, may occur and distort the validity of the result obtained.
- Survey method demands expertise, research knowledge and sophistication on the part of the researcher. In other words the researcher must know the techniques of sampling, questionnaire construction, interviewing and analysis of data.

4.5.3 Field Studies

Field studies are ex-post scientific inquiries aimed at discovering the relations and interactions among sociological, psychological and educational variables in real social structures. In scientific studies, large or small, they systematically pursue relations and test hypotheses, that are ex-post facto, that are made in actual life situations, will be considered field ex-post factor, that are made in actual life situations, will be considered field studies. The investigator in a field stud looks at the social or institutional situation and then studies the relations among the attitudes, values, perceptions, and behaviours of individuals and groups in the situation. He ordinarily manipulates no independent variables.

Katz (1953) has divided field studies into two board types – exploratory and hypothesis testing. The exploratory types seek what is, rather than predict relations to be found. They have three purposes : (1) to discover significant variables in the field situation, (2) to discover relations among variables (3) to lay a ground work for later, more systematic and rigorous testing of hypothesis.

It is well to recognise though that there are activities preliminary to hypothesis testing in scientific research. In order to achieve the desirable aim of hypothesis testing, preliminary methodological and measurement investigation must often be done. The second sub-type of exploratory field studies, research aimed at discovering or uncovering the relations, is indispensable to scientific advancement in the social sciences.

The field studies are strong in realism, significance, strength of variables, theory orientation and heuristic quality. The realism of field studies is obvious. They are highly heuristic. Any researcher knows that one of the research difficulties of the field studies is to keep himself contained within the limits of his problem. Hypothesis is frequently fling themselves at one. The field is rich in discovery potentiality. After starting to gather data, he might stumble upon many interesting notions that can reflect the course of investigation.

Despite these strengths, the field study is a scientific weakness of laboratory experiments. Its most serious weakness of course is its ex-post facto character. Anther methodological weakness is lack of precision in the measurement of field variables. Other weakness of field studies are practical problems: feasibility, cost, sampling, and time. The field researcher therefore, needs to be salesman, administrator and entrepreneur as well as investigator.

4.5.4 Case Study

The case study is one of the important types of non-experimental research. The case study is not a specific technique rather it is one way of organising social data for the purpose of viewing social reality. It tends to preserve the unitary character of a social object being studied. It tends to examine a social unit as a whole. The unit may be a person a family a social group a social institution or even a community (Goode & Hatt 1981, Best & Kahn 1992).

A case study may utilise interview, observation, and psychological tests. It is a valuable research strategy in the fields of clinical psychology and human development. Using case study a researcher is able to have an in-depth look at one person. Those unique aspects of a person's life which cannot be duplicated for practical or ethical reasons are captured by case study. With the help of case study you can try to understand fantasies hopes fears traumatic experiences upbringing or anything that helps to understand a person's mind and behaviour. Case studies provide a narrative or detailed description of the events that takes place in a person's life. Freud's insight that led to the development of psychoanalytic theory emerged from his observation and reflections on individual cases. It should be remembered that the person studied as a case is unique and our judgments are of unknown reliability. Case studies provide detailed in-depth depictions of people's lives but we need to exercise caution when generalizing from individual cases. They are like naturalistic observations and all one can do is to describe the course of events.

The problem of validity of single case study is very serious. It is therefore recommended that researchers should use objective measurement techniques multiple sources of information and frequent assessment of relevant variables. The uses of case study as a research strategy requires that the cases must be chosen that represent the variable in question and one must have sufficient access to the cases. Careful planning of data-collection is very necessary. Throughout the data-collection process the investigator is required to maintain a chain of evidence linking the various data sources having bearing on the research questions.

Self Assessment Questions

1) Detailed and in-depth description of people lives can be obtained through survey methods. T/F
2) Census is an example of correlational research. T/F
3) Survey helps to understand population. T/F
4) A case study may utilise observation and interview. T/F
5) Observer bias is one of the important problem associated with survey method. T/F
6) Case study method is most useful in clinical setting. T/F
7) Opinion polls are the examples of survey methods. T/F
8) Social behaviour under the war condition can be studied by the field study method. T/F
9) Quasi-experimental research involves random assignment of subject to different groups. T/F
10) Descriptive research does not have the characteristics of manipulations. T/F

4.6 EXPERIMENTAL METHODS

4.6.1 Laboratory Experiments

As you know a laboratory experiment is one of the most powerful techniques for studying the relationships between variables under controlled condition. It may be defined as the study of a problem in a situation in which some variables are manipulated and some are controlled in order to have an effect upon the dependent variable. The variables which are manipulated are known as independent variables and the variables which are controlled, are known as extraneous or relevant variables. Thus in a laboratory experiment the effect of manipulation of an independent variable upon the dependent variable is observed under controlled conditions. Festinger & Katz (1953:137) have defined a laboratory experiment as "one in which the investigator creates a situation with the exact conditions he wants to have and in which the controls some, and manipulates other variables".

Kerlinger (1986), there are three main purposes of the laboratory experiment. First, a laboratory experiment purports to discover a relationship between the dependent variable and the independent variable under pure, uncontaminated and controlled conditions. When a particular relationship is discovered, the experimenter is better able to predict the dependent variable. Second, a laboratory experiment helps in testing the accuracy of predictions derived from theses or researches. Third, a laboratory experiment helps building the theoretical systems by refining theories and hypotheses and thus, provides a breeding ground for scientific evaluation of those theories and hypotheses.

A laboratory experiment has some strength and weakness you have already read in the previous unit II, you may refer this for the detailed thereof.

4.6.2 Field Experiment

A field experiment is very similar to a laboratory experiment. A field experiment may be defined as a study carried out in a more or less realistic situation or field where the experimenter successfully manipulates one or more independent variables under the maximum possible controlled conditions. Experimenter manipulates one or more independent variable in natural setting for determining their effect upon behaviour, the procedure is known as field experiment.

Field experiment has number of Strengths which are given below:

1) A field experiment deals with the realistic life situation. Hence it is more suited for studying social changes, social processes and social influence.

2) One principle of research is that the more realistic the situation, the stronger is effect of the variables under study. In a field experiment this principle is fully satisfied. Thus, one can say that in the field experiment, since it deals with a realistic situation, the variables have stronger and more obvious effects.

3) Is derived from the above two points. When variables are stronger because of more realistic situations, an experimenter can make better and more sound generalisations on the basis of the obtained results. In other words, this tends to increase the external validity of the field experiment. For example, when one carried out a field experiment by taking small groups of workers from a factory, and reaches the conclusion that absenteeism among workers is primarily due to the poor financial incentive, this can be safely generalized with respect to the workers of other factories as well because the experiment has been carried on actual workers in a factory.

4) A field experiment is well-suited for testing a broad hypothesis and theories and for obtaining answers to practical questions.

The principles **weaknesses of field experiments** are as given below:

1) Since a field experiment is carried out in a realistic situation, there is always the possibility that the effect of independent variables is contaminated with uncontrolled environmental variables.

2) The unexpected noise and gathering may affect the dependent variable and thereby, contaminate the influence of the independent variable. In a laboratory experiment this problem does not arise because of the fully controlled laboratory situation. However, if the situation is somehow fully controlled in a field experiment, it would prove to be a more powerful tool than the laboratory experiment.

3) In many field situations the manipulation of independent variables may be difficult due to non-cooperation of subjects. Children are to be exposed to frustrating situations; they may not like it and may restrain their children from being exposed to field situation.

4) In a field experiment it is not possible to achieve a high degree of precision or accuracy because of some uncontrolled environment variables.

5) Field experiment requires that the investigator has high social skills to deal effectively with people in a field situation.

4.7 LET US SUM UP

Psychological researches have been classified depending upon the extent to which they satisfy requirement of a scientific procedure based on the purpose for which it is undertaken. There are two types of psychological researches – Non-experimental and experimental research. In non-experimental researches, the independent variable is not manipulated, the researcher does not have complete control over the conditions of the non-experimental research study. Non-experimental researches are covered descriptive, historical correlational, qualitative and ex- post facto research. Experimental researches are controlled manipulation of the variables that allows the researcher to determine the cause and effect relationship. The unit has described the two types of experimental research i.e. true experimental research and quasi-experimental research. Moreover this unit has described the major methods of non-experimental researches namely – naturalistic observation, case studies, content analysis, achieves, field studies etc. Finally two research method of the experimental research i.e. laboratory experiment and field experiment are highlighted.

4.8 UNIT END QUESTIONS

1) Describe the various types of non-experimental researches.

2) What do you mean by experimental researches? Discuss the types of experimental research.

3) Compare experimental research and non experiment research with relevant examples.

4) Compare field experiment and laboratory experiment with example.

5) What is survey research? Discuss advantage and disadvantage of survey research.

4.9 GLOSSARY

Descriptive : Describe the characteristics of an existing phenomenon.

Historical : Relate events that have occurred in the past to current events.

Correlational : Examine the relationship between variables.

Qualitative : To examine human behaviour and the social cultural and political contexts within which it occurs.

True Experimental : To test for true cause and effect relationship.

Quasi Experimental : To test for casual relationship without having full control.

Naturalistic Observation : observational research of subjects in their natural environment carried out to disturb the subjects as little as possible.

Archival Method : study method that examines existing records to obtain date and test hypotheses.

Case Study : study of one individual in great detail

Observer Bias : tendency of observer to see what they expect to see.

Laboratory Experiments : the techniques for studying the relationship between the variables under control condition

Field Experiment : a study carried out in more or less realistic situation where the experimenters manipulate independent under the maximum possible control condition.

Ex-Post Facto Research : investigator attempts to trace an effect which has already occurred to its probable causes

Survey : assessing public opinion or individual characteristics by the use of questionnaire and sampling methods.

Self Assessment Questions

Answers: 1. (a) 2 (b) 3 (d) 4 (c) 5. (a) 6. (b) 7 (b) 8. (b) 9. (a) 10. (c)

True/False

Answers: 1.F, 2.F, 3.T, 4 T, 5.F, 6.T, 7.T, 8.T, 9.F, 10.T

4.10 SUGGESTED READINGS

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UNIT 1 DEFINITION AND DESCRIPTION RESEARCH DESIGN, QUALITY OF RESEARCH DESIGN

Structure

1.0 Introduction

1.1 Objectives

1.2 Research Design

1.3 Purpose of Research Design

- 1.3.1 Answers to Research Questions
- 1.3.2 Research Design Acts as Variance Control
- 1.3.3 Systematic Variance
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- 1.5.1 Capability to Answer Research Questions Adequately
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1.9 Suggested Readings

1.0 INTRODUCTION

Having decided what you want to study about, the next question comes up as to how are you going to conduct your study? What procedures will you adopt to obtain answers to research questions? How will you carry out the tasks needed to complete the different components of the research process? What should you do and what should you not do in the process of undertaking the study?

These are some of the questions that need to be answered before we proceed to conduct the study. Basically, answers to these questions constitute the core of a research design. This unit therefore begins with the definition and the description of the research design. Then the purpose of the research design is highlighted in which you will study how a research can maximize the systematic variance, control extraneous variance through the various controlling techniques i.e. randomization, matching, elimination and statistical control. Further you will find how a researcher can minimize the error variance. Moreover, research cannot ignore the criteria of good design. This unit acquaints you with the basic criteria of research through which you can distinguish good design from weak design. Finally, the qualities of research design are indicated and described.

1.1 OBJECTIVES

After reading this unit, you will be able to:

- Define research design;
- Describe research design in terms of its various components;
- Discuss various objectives/purpose of research design;
- Describe the different procedures to control the extraneous variable and reduce error variance;
- Explain the criteria of research design; and
- State the qualities of research design.

1.2 RESEARCH DESIGN

Winner (1971) compared the research design to an architect's plan for the structure of a building. The designer of researcher performs a role similar to that of the architect. The owner of the building gives his basic requirements to the architect, who then exercising his expertise, prepares a plan or a blue print outlining the final shape of the structure.

Similarly, researcher has to do planning or prepare a structure before starting data collection and analysis. According to Myers (1980), the research design is the general structure of the experiment, not its specific content. In fact, the research design is the conceptual structure within which research is conducted; it constitutes the blueprint for the collection, measurement and analysis of data.

According to Thyer (1993) a traditional research design is a blueprint or detailed plan for how to conduct a research study and how to complete the same. Planning such a research design involves, (i) operationalising variables so that they can be measured, (ii) selecting a sample of interest to study, (iii) collecting data to be used as a basis for testing hypothesis, and (iv) analysing the results.

According to Matheson (1970) a research design is a basic plan for research, including the assignment of subjects to the levels of the independent variable and the manipulation of the independent variable.

According to Kerlinger (1986) research design is the plan, structure, and strategy of investigation conceived so as to obtain answers to research questions and to control variance.

The definition of Kerlinger reveals three important components, which are (i) research design is a plan (ii) research design is the structure (iii) research design is the strategy. Let us see what these are:

i) *Research Design is the Plan*: The plan is the overall scheme or program of the research. It includes an outline of what the investigator will do from writing the hypotheses and their operational implications to the final analysis of data.

ii) *Research Design is the Structure*: The structure of the research is more specific. It is the outline, the scheme, the paradigm, of the operation of the variables. When we draw diagrams that outline the variables and their relation and juxtaposition, we build structural schemes for accomplishing operational research purposes.

iii) *Research Design is the Strategy*: Strategy as used here is also more specific than plan. It includes the methods to be used to gather and analyse the data. In other words strategy implies how the research objectives will be reached and how the problems encountered in the research will be tackled.

1.3 PURPOSE OF RESEARCH DESIGN

The purpose of research design is to provide a maximum amount of information relevant to the problem under investigation at a minimum cost. The research design has the toll purposes:

1.3.1 Answers to Research Questions

Research design is formulated to enable the researcher to answer research questions such as validity, objectivity, accuracy, and describe research plans as economically as possible. Any research plan is deliberately and specifically conceived and executed to bring empirical evidence to bear on the research problem. Research design sets up the framework for adequate test of relations among variable. The research design in a way tells us what observations to make, how to make them and how to analyse the quantitative representations of the observations. It also tells us as to what types of statistical analysis to use. Finally, an adequate design outlines possible conclusions to be drawn from statistical analysis. Thus a research design after moving through the sequence of different related steps enables the researcher to draw a valid and objective answer to research questions.

1.3.2 Research Design Acts as Variance Control

The main technical function of research design is to control variance. Research design is a set of instructions to the investigator together analyse data in certain ways. Therefore, research design acts as control mechanism and enables the researcher to control unwanted variances. Various control is a central theme of research design. Variance control as we shall notice throughout this book, is the central theme of experience design. Variance is a measure of the dispersion or spread of a set of scores. It describes the extent to which the scores differ from each other. Variance and variation, through used by synonymously, are not identical terms. Variation is a more general term which includes variance as one of the statistical methods of representing methods.

1.3.3 Systematic Variance

The researcher is directly concerned with three types of variance namely experimental variance, extraneous variance and error variance. Main functions of research design are to maximize the effect of systematic variance, control extraneous variance and minimize error variance. A discussion of these variances is presented below.

Systematic Variance: by constructing an efficient research design the investigator attempts to maximize the variance of the variable of substantive research hypotheses. Systematic variance is the variability in the dependent measure due to the manipulation of the experimental variable by the experimenter. An important task of the experimenter is to maximize this variance. This objective is achieved by making the level of the experimental variable as unlike as possible. Suppose an experimenter is interested in studying the effect of intensity of light on visual acuity. The experimenter decides to study the effect by manipulating three levels of light intensity, i.e. 10 ml, 15ml, 20 ml. as the difference between any two levels of the

experimental variable is not substantial, and there is little chance of separating its effect from the total variance. Thus, in order to maximize systematic variances, it is desirable to make the experimental conditions (levels) as different as possible. In this experiment it would be appropriate, then to modify the levels of light intensity to 10 ml, 20 ml, and 30 ml so that the difference between any two levels is substantial.

1.3.4 Extraneous Variance

Extraneous variance is produced by the extraneous variables or the relevant variables. An experimenter always tries to control the relevant variables and thus, also wants to eliminate the variances produced by these variables. For elimination of extraneous variance it is essential that the extraneous variables be properly controlled. There are four ways to control the extraneous variances. These procedures are elimination, randomization, matching, and statistical control. A discussion of these procedure is given below:

1) **Randomization:** an important method of controlling extraneous variables is randomization. It is considered to be the most effective way to control the variability due to all possible extraneous sources. If through randomization has been achieved then the treatment groups in the experiment could be considered statistically equal in all possible ways. Randomization is a powerful method of controlling variable. In other words it is a procedure for equating groups with respect to secondary variable. Randomization means random selection of the experimental units from the larger population. Random assignment means that every experimental unit has an equal chance of being placed in any of the treatment conditions or groups. In using randomization method some problems may be encountered. It is possible to select a random sample from a population, but then assignment of experimental units to groups may get biased. Random assignment of subjects is critical to internal validity. If subjects are not assigned randomly, confounding may occur.

   Randomized group design and randomized block design are the examples of research design in which randomization is used to control the extraneous variable.

2) **Elimination:** this procedure is the easiest way to controlling the unwanted extraneous variable through elimination of variable. Suppose, the sex of the subject as unwanted secondary variable, is found to influence the variable in an experiment. Therefore the variable of sex has to be controlled. The researcher may decide to take either all males and all females in an experiment and thus, controlled through elimination the variability due to the sex variable.

   By using elimination for controlling the extraneous variables, researcher looses the power of generalisation. If the researcher selects the subject from a restricted range then the researcher can generalise the results within restricted range and not outside it. Elimination procedure is used in non-experimental design.

3) **Matching:** is also a non-experimental design procedure, is used to control the extraneous source of variance. In case of controlling organismic and background variable matching is used in this procedure the relevant variable are equated or held constant across all conditions of experiments. Suppose if the researcher finds that the variable of intelligence is highly correlated with the dependent variable, it is better to control the variance through matching on the variable of intelligence. However as a method of control matching

limits the availability of subjects. If the researcher decides to match subjects on two or three variables he may not find enough subjects for the experiment. Besides this the method of matching biases the principles of randomization.

4) **Statistical Control:** in this approach, no attempt is made to restrain the influence of secondary variables. In this technique, one or more concomitant secondary variables (covariates) are measured and the dependent variable is statistically adjusted to remove the effects of the uncontrolled sources of variation. Analysis of covariances is one such technique. It is used to remove statistically the possible amount of variation in the concomitant secondary variable.

1.3.5 Error Variance

The third function of a research design is to minimize the error variance. The error variance is defined as those variance or viabilities in the measures, which occurs as a function of the factors not controllable by the experimenter. Such factors may be related to the individual differences among the subjects themselves such as to their attitude, motivation, need, ability etc. They may be related to what is commonly called the errors of measurements such as the differences in trials differences in conditions of experiment, temporary emotional state of the subject, fatigability etc.

Statistical controls can be applied to minimize such error variance. For example, repeated measures design can be used to minimize the experimental error. By this technique the variability due to the individual differences is taken out from the total variability, and thus, the error variance is reduced. Analysis of covariances is also a technique to reduce the error variance. Further, error variance can be controlled by increasing the reliability of measurement by giving clear and unambiguously instructions and by using a reliable measuring instrument etc

1.4 DESIGN SELECTION

The selection of a specific type of design depends primarily on both the nature and extent of the information. Complex designs, usually involving a number of "control groups," offer more information than a simple group design. However, not all of the relevant information may be needed can be derived from any given design. Some of the information is based on the assumptions and some information are explicit. Other information derives from a network of knowledge surrounding the project in question. Theories, accepted concepts, hypotheses, principles and empirical evidence from related studies ought to be considered in design selection.

1) What questions will this design answer? To do this, we must also be able to specify many of the questions the design won't answer as well ones it will answer. This should lead to a more realistic approach to experimental design than is usually given. Some simple and useful designs have been labeled as "poor" because they are relatively simple and will not answer some questions. Yet, they may provide clear and economical answers to the major questions of interest. Complex designs are not as useful for some purposes.

2) What is the relative information gain/cost picture? There is no specific formula or strategy for deriving some cut-off point in this regard. The major point here is that the researcher must take a close look at the probable cost before selecting a design.

Besides this, choice of design depends on different factors, such as;

Feasibility

How reliable should the information be?

Is it ethical to conduct the study?

Cost

Time

Self Assessment Questions

Multiple Choice Questions

1) Who said 'Research design is the plan, structure, and strategy of investigation conceived so as to obtain answers to research questions and to control variance'.
   a) Myers
   b) Mcquigan
   c) Matheson
   d) Kerlinger
2) Which technique is not included to control the effect the extraneous variable?
   a) Matching
   b) Elimination
   c) Extinction
   d) Randomization
3) Which one of the following is not considered as the purpose of research design.
   a) Error variance
   b) Extraneous variable
   c) Statistical variance
   d) Systematic variance
4) Which one of the following is considered as most appropriate technique of control of the extraneous variables?
   a) Elimination
   b) Randomization
   c) Matching
   d) Statistical Control
5) A Good design possess following qualities except one:
   a) Feasible
   b) Simple
   c) Efficient
   d) Theory base

6) Which statement is not correct for research design:

   a) Research design is the blueprint of the detailed procedures of testing the hypotheses and analysing the obtained data.

   b) Research design is the structure of the investigation that provides a model to study the mutual relationship among the different variable.

   c) Research design helps in formation of hypotheses and recognise the variables.

   d) Research design helps in searching the correct solution of the problem.

Answers: 1. (d), 2. (c), 3. (c), 4. (b), 5. (b), 6. (d)

True/False

1) Research design is a blue print of collection, measurement and analysis of data. T/F

2) The function of research design is to minimize the effect of systematic variance and maximize error variance. T/F

3) Generalisibility enhances the internal validity of research. T/F

4) Variance is the measure of dispersion or spread of a set of scores. T/F

5) Random selection of the experimental unit from the larger population is known as random assignment. T/F

6) Analysis of covariance is used to reduce the error variance T/F

Answers: 1. (T), 2. (F), 3. (F), 4. (T), 5. (F), 6. (T)

1.5 CRITERIA OF RESEARCH DESIGN

As you know that there are various types of research design. Some are weak design and some are good design. Behavioural researchers have been able to formulate certain criteria on the basis of which you can distinguish the good design from weak design. These criteria have proved very useful in guiding the researches in right direction. These criteria are mentioned below.

1.5.1 Capability to Answer Research Questions Adequately

A good research design is the design that answers research questions adequately. Sometimes, the researcher selects a design which is not appropriate for answering the research question in hand. Such designs constitute the example of weak research design. Such a design does not adequately test the hypotheses either. It is a common practice that students while trying to answer a research question by conducting experiment or doing research, often match sex, age intelligence of the subjects on the assumption that such matching would lead to the setting of a better experimental group and control group. The reality is that if there is no relation between say, age and the dependent variable then matching an age will be irrelevant. Therefore, any design based upon matching would be a weak design.

1.5.2 Control of Variables

Another criterion of a good research design is that it should control the effects of extraneous variables which are more or less similar to independent variables that

have the capacity to influence dependent variables. If left uncontrolled, such variables are called independent extraneous variables or simply extraneous variables. A design which fails to control the effect of extraneous variables is considered a weak one and the research should avoid such designs.

There are various ways to control the effects of extraneous variables. Of these ways randomization is considered by many as one of the best techniques of controlling the extraneous variables. There are three basic phases in randomization-random selection of subjects, random assignment of subjects into control and experimental groups and random assignments of experimental treatments among different groups. Sometimes, it happens that for the researcher it is not possible to make random selection of subjects. In such situations the researcher tries to randomly assign the selected subjects into different experimental groups. When this random assignment is not possible due to any reason, the researcher randomly assigns the different experimental treatments into experimental groups. Randomization has proved very useful in controlling the extraneous variables. This increases the internal validity of the research.

1.5.3 Generalisability

The third criterion of research design is generalisability. Generalisibility is the external validity of the research. In other words it refers to the extent to which the results of the experiment or research obtained can be generalised to subjects, groups or conditions not included in sample of the research. If the design is such as the obtained results can be generalised to larger groups or subjects, the design is considered to be a good one.

1.6 QUALITIES OF RESEARCH DESIGN

A good design is characterised by flexible; appropriate, efficient, economical and so on. The design which minimizes bias and maximizes the reliability of the data collected and analysed is considered a good design. The design which gives the smallest experimental error is supposed to be the best design in many investigations. Similarly, a design which yields maximal information and provides an opportunity for considering many different aspects of a problem is considered the most appropriate and efficient design. Thus, the question of good design is related to the purpose or objective of the research problem and also with the nature of the problem to be studied. One single design cannot serve the purpose of all types of research problem. Throughout the design construction task, it is important to have in mind some endpoint, some criteria which are to be achieved before accepting a design strategy. The criteria below are only meant to be suggestive of the characteristics found in good research design.

Theory base: Good research strategies reflect the theories which are being investigated. Where specific theoretical expectations can be hypothesised these are incorporated into the design. For example, where theory predicts a specific treatment effect on one measure but not on another, the inclusion of both in the design improves discriminant validity and demonstrates the predictive power of the theory.

Situational: Good research designs reflect the settings of the investigation. This was illustrated above where a particular need of teachers and administrators was explicitly addressed in the design strategy. Similarly, intergroup rivalry, demoralisation, and competition might be assessed through the use of additional comparison groups who are not in direct contact with the original group.

Feasible: Good designs can be implemented. The sequence and timing of events

are carefully thought out. Potential problems in measurement, adherence to assignment, database construction and the like, are anticipated. Where needed, additional groups or measurements are included in the design to explicitly correct for such problems.

Redundant: Good research designs have some flexibility built into them. Often, this flexibility results from duplication of essential design features. For example, multiple replication of a treatment helps to insure that failure to implement the treatment in one setting will not invalidate the entire study.

Efficient: Good designs strike a balance between redundancy and the tendency to overdesign. Where it is reasonable, other, less costly, strategies for ruling out potential threats to validity are utilised.

This is by no means an exhaustive list of the criteria by which we can judge good research design. Nevertheless, goals of this sort help to guide the researcher toward a final design choice and emphasise important components which should be included.

1.7 LET US SUM UP

We have noticed that research design is a plan, structure and strategies of the collection measurement and analysis of data. Research design purports to obtain answers to research questions and controlling variance. Moreover, research design answers the question as objectively, validly and economically as possible. Main functions of the research design are to maximize the effect of systematic variance, control extraneous variance through randomization, elimination, matching and statistical control and minimize the error variance. A good research design is characterised by feasibility, flexibility, generalisability, theory base, cost and time.

1.8 UNIT END QUESTIONS

1) What do you mean by research design? Discuss the basic purposes of research design. How can you minimize the extraneous variance? Discuss the various ways to control the extraneous variable.
2) Discuss criteria of a research design with appropriate example.
3) Make distinction between random assignment and random selection in terms of their uses in research.
4) Discuss the qualities of research design.

1.9 SUGGESTED READINGS

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UNIT 2 EXPERIMENTAL DESIGN (CONTROL GROUP DESIGN AND TWO FACTOR DESIGN)

Structure

2.0 Introduction

2.1 Objectives

2.2 Experimental Design

2.3 Basic Elements of Valid Experimental Design

2.4 Types of Designs
- 2.4.1 True Experiment
- 2.4.2 Control Group Design
  - 2.4.2.1 Types of Control Group Design
  - 2.4.2.2 Pretest Posttest Control Group Design
- 2.4.3 Solomon Four Group Design

2.5 Two Factor Design
- 2.5.1 Main Effect and Interaction Effect
- 2.5.2 Graphical Presentation of Main Effect and Interaction Effect
- 2.5.3 Two Factor, Multi Level Factorial Design

2.6 Uses of Factorial Design

2.7 Advantages and Disadvantages of Factorial Design

2.8 Let Us Sum Up

2.9 Unit End Questions

2.10 Suggested Readings

2.0 INTRODUCTION

Psychologists make decisions about hypothesised relationships between independent and dependent variables based upon observations of behaviour. One way to organise the observational process is to employ an experimental design.

This unit tries to acquaint you with control group design and two factor design (factorial design) which are used as true experimental design in psychological researches. It begins with the nature and basic elements of experimental design and focuses on the terminology of experimental design. Further, you will find the description of control group design and three types of control group one as post test only, one as control group design, and one as pretest posttest control group design and one as Solomon four group design with relevant examples.

Moreover this unit continues with the discussion of the factorial design in which you will study the nature of factorial design. This will provide answers to the questions like how can you sketch a layout of factorial design, how basic terminology of experimental design are worked out, how can you study the main effect and interaction effect of the different variables and how can you interpret your result with the help of graphical presentation. Finally, advantage and disadvantage of factorial design are described.

2.1 OBJECTIVES

After reading this unit, you will be able to:

- Explain experimental design;
- Describe types of control group design;
- Distinguish posttest only, control group design with pretest posttest control group design;
- Interpret main effect and interaction effect theoretically and graphically;
- List advantage and disadvantage of factorial design; and
- Draw the layout plan of various types of control group design and factorial design.

2.2 EXPERIMENTAL DESIGN

The term "experimental design" may be used in two different ways (Kirk, 1968).

i) It may be used to refer to the sequence of steps necessary to conduct an experiment (stating the hypothesis, detailing the data collection process, and so on).

ii) It may be used to refer to the plan by which subjects are assigned to experimental conditions.

The experimental design is relatively simple, as for example, when one group of subjects is exposed to an independent variable and another is not. On the other hand, it may be much more complex, involving two or more than two independent variables and repeated measurements of the dependent variables.

The overall blueprint of the experiment is called experimental design. It contains the specification of the plan and structure of the entire experiment. For the sake of precision, the variables and their measures are defined and specific instructions for the experimental conditions are clearly written. A good experimental design minimizes the influence of extraneous or uncontrolled variation and increases the likelihood that an experiment will produce valid and consistent results.

2.3 BASIC ELEMENTS OF VALID EXPERIMENTAL DESIGN

a) *Factor:* The independent variables of an experiment are often called the factors of experiment. An experiment has always one factor, or independent variables, otherwise it would not be an experiment. It is possible for an experiment to have more than one independent variables. To have an experiment, it is necessary to vary some independent variable, or some factors.

b) *Level***:** a level is a particular value of an independent variable. Level refers to the degree or intensity of a factor. Any factor may be presented in one or more of several levels, including a zero level.

c) *Condition* is the broadest term used to discuss independent variables. It refers to a particular way in which subjects are treated.

d) *Main effect*: Main effect is the effect of one independent variable, averaged over all levels of another independent variable.

e) *Interaction*; when the effect of one independent variable depends on the level of another independent variable.

f) *Treatment*: the treatment is used to refer to a particular set of experimental condition. For example 2X2 factorial experiment, the subjects are assigned to for the treatment. In experiments, a treatment is something that researchers administer to experimental units.

Two particular elements of a design provide control over so many different threats to validity that they are basic to good experimental designs; (1) the existence of a control group or a control condition and, (2) the random allocation of subjects to groups. Random allocation ensures that the groups will be equal in all respects, except as they may differ by chance and control over the internal threats to validity; allows one to conclude that dependent variable is associated with independent variable and not with any other variables.

In discussing experimental design, Campbell & Stanley(1963) have used some symbols with which a student/reader is expected to be acquainted.

- **R:** Random selection of subjects or random assignment of treatment to experimental groups.
- **X:** Treatment or experimental variable which is manipulated. When treatments are compared they are levelled as X_1, X_2, X_3 and so on.
- **O:** Observation or measurement or test. Where there is more than one O, an arbitrary subscript O_1, O_2, O_3 and so on, is used.

2.4 TYPES OF DESIGNS

Designs can be classified into a simple three fold classification by asking some key questions. First, does the design use random assignment to groups? If random assignment is used, you can call the design a **randomized experiment** or **true experiment**. If random assignment is not used, then you have to ask a second question: Does the design use either multiple groups or multiple waves of measurement? If the answer is yes, you can be labeled as **quasi-experimental design**. If no, you can call it a **non-experimental design**. This threefold classification is specially useful for describing the design with respect to internal validity.

Now, let us understand true experiment before we go to explain control group design and two factor design.

2.4.1 True Experiment at Design

The experimenter has complete control over the experiment: the who, what, when, where, and how. Control over the who of the experiment means that the experimenter can assign subjects to conditions randomly for example we can put 'A' in example 1, 'B' in example 2, 'C' in example 1, 'D' in example 2 etc. Control over the what, when, where, and how of the experiment means that the experimenter has complete control over the why the experiment is to be conducted. True experiments include two major types of experimental designs: A) single factor design (between subjects and within subjects), B) two factor design (factorial design)

Experimental design differs in relation to research purpose. Control group designs are also called true experimental design. A discussion of control group design and two factor design are given below.

2.4.2 Control Group Design

Description

Two parallel experiments are set up, identical in all respects except that only one includes the treatment being explored by the experiment. The people in both groups should be similar. Ideally, these are selected and assigned randomly, though in practice some groups come as one (such as school classes) or are selected on a pseudo-random basis (such as people on the street).The control group may have no treatment, with nothing happening to them, or they may have a neutral treatment, such as when a placebo is used in a medical pharmaceutical experiment.

2.4.2.1 Types of Control Group Design

There are four types of control group design which are described hereunder:

Post-Test Only, Equivalent Group Design

This design is the most effective and useful true experimental design, which minimizes the threats to the experimental validity. This design can be diagrammed as given below.

R1	X	O
R2		O

In the above design are two groups. One group R_1 is given treatment (X), usually called the experimental group, and the other group R_2 is not given any treatment and R_2 is called the control group. Both groups are formed on the basis of random assignment of the subjects and hence, they are equivalent. Not only that, subjects of both groups is initially randomly drawn from the population (R). This fact controls for selection and experimental mortality. Besides these, in this design no pretest is needed for either group, which saves time and money. As both groups are tested after the experimental group has received the treatment, the most appropriate statistical tests would be those tests which make a comparison between the mean of O_1 and O_2. Thus either t- test or ANOVA is used as the appropriate statistical test.

Let us take an example. Suppose the experimenter, with the help of the table of random numbers, selects 50 students out of a total of 500 students. Subsequently, these 50 students are randomly assigned to two groups. The experimenter is interested in evaluating the effect of punishment over retention of verbal task. The hypothesis is that punishment enhances the retention score. One group is given punishment (X) while learning a task and another group receives no such punishment while learning a task. Subsequently, both groups are given the test of retention. A simple comparison of mean retention scores of the two groups is carried out through the t- test which provides the basis for refuting or accepting the hypothesis.

The only problem with the *post-test* is that there is no direct indication of what actual change is found in the treatment group. This is corrected by measuring them before and after the treatment. The control group is still useful as additional factors may have had an effect, particularly if the treatment occurs over a long time or in a unique context.

2.4.2.2 Pretest- Posttest Control Group Design

This is also called the classic controlled experimental design, and the randomized pre-test/post-test design because it

1) Controls the assignment of subjects to experimental (treatment) and control groups through the use of a table of random numbers.

   This procedure guarantees that all subjects have the same change of being in the experimental or control group. Because of strict random assignment of subjects, it is assumed that the two groups are equivalent on all important dimensions and that there are no systematic differences between the two groups. Researchers may substitute matching for random assignment. Subjects in the two groups are matched on a list of characteristics that might affect the outcome of the research (e.g., sex, race, income). This may be cheaper but matching on more than three or four characteristics is very difficult. And if the researcher does not know which characteristics to match on, this compromises internal validity.

2) Controls the timing of the independent variable (treatment) and which group is exposed to it.

   Both groups experience the same conditions, with the exception of the experimental group, which receives the influence of the independent variable (treatment) in addition to the shared conditions of the two groups.

3) Controls all other conditions under which the experiment takes place.

Nothing but the intervention of the independent (treatment) variable is assumed to produce the observed changes in the values of the dependent variable.

The steps in the classic controlled experiment are:

1) Randomly assign subjects to treatment or control groups;

2) Administer the pre-test to all subjects in both groups;

3) Ensure that both groups experience the same conditions except that in addition the experimental group experiences the treatment;

4) Administer the post-test to all subjects in both groups;

5) Assess the amount of change on the value of the dependent variable from the pre-test to the post-test for each group separately.

These steps are diagramed as follows:

R	O_1	X	O_2
R	O_1		O_2

This diagram can be expanded upon as in the following table:

Table: Diagram representing experimental design

Scientific Random assignment of Subjects to:	1st observation (measurement) of the dependent variable O_1 = Pre-test	Exposure to the Treatment (X) (independent variable)	2nd observation (measurement) of the dependent variable O_2 = Post-test
Experimental Group	Experimental Group's average score on the dependent variable	X	Experimental Group's average score on the dependent variable
Control Group	Control Group's average score on the dependent variable		Control Group's average score on the dependent variable

The difference in the control group's score from the pre-test to the post-test indicates the change in the value of the dependent variable that could be expected to occur without exposure to the treatment (independent) variable X

Control group Post test scores – control group Pre test scores = control group difference

Experimental group pre-test score – Experimental group post-test scores = the difference obtained as a result of independent variable.

The difference in the experimental group's score from the pre-test to the post-test indicates the change in the value of the dependent variable that could be expected to occur with exposure to the treatment (independent) variable X.

(Experimental group – pre-test score) (Experimental group = post-test score) (Experimental group difference on the dependent variable)

The difference between the change in the experimental group and the change in the control group is the amount of change in the value of the dependent variable that can be attributed solely to the influence of the independent (treatment) variable X.

Control group difference – experimental group difference = difference attributable to X (the manipulation of the independent variable)

This design follows all the same steps as the classic pre-test/post-test design except that it omits the pre-test. There are many situations where a pre-test is impossible because the participants have already been exposed to the treatment, or it would be too expensive or too time-consuming. For large groups, this design can control most of the threats to internal and external validity as does the classic controlled experimental design. For example, it eliminates the threat to internal validity of pre-testing by eliminating the pre-test. It may also decrease the problem of experimental mortality by shortening the length of the study (no pre-test). For small groups, however, a pre-test is necessary. Also, a pre-test is necessary if the researcher wants to determine the exact amount of change attributable to the independent variable alone.

For many *true experimental designs*, pretest-posttest designs are the preferred method to compare participant groups and measure the degree of change occurring as a result of treatments or interventions.

Pretest-posttest designs grew from the simpler posttest only designs, and address some of the issues arising with assignment bias and the *allocation* of participants to groups.

One example is education, where researchers want to monitor the effect of a new teaching method upon groups of children. Other areas include evaluating the effects of counseling, testing medical treatments, and measuring psychological constructs. The only stipulation is that the subjects must be *randomly* assigned to groups, in a true experimental design, to properly isolate and nullify any nuisance or *confounding variables*.

Problems with Pretest-Posttest Designs

The main problem with this design is that it improves *internal validity* but sacrifices *external validity*. There is no way of judging whether the process of pre-testing actually influenced the results because there is no baseline measurement against groups that remained completely untreated. For example, children given an educational pretest may be inspired to try a little harder in their lessons, and both groups would outperform children not given a pretest, so it becomes difficult to *generalise* the results to encompass all children.

The other major problem, which afflicts many sociological and educational research programs, is that it is impossible and unethical to isolate all of the participants completely. If two groups of children attend the same school, it is reasonable to assume that they mix outside of classrooms and share ideas, potentially contaminating the results. On the other hand, if the children are drawn from different schools to prevent this, the chance of *selection bias* arises, because randomization is not possible.

The two-group control group design is an exceptionally useful research method, as long as its limitations are fully understood. For extensive and particularly important research, many researchers use the *Solomon four group methods*, a design that is more costly, but avoids many weaknesses of the simple pretest-posttest designs.

2.4.3 Solomon Four Group Design

The Solomon four-group design developed by Solomon (1949) is really a combination of the two equivalent groups designs described above, namely the posttest – only design and pretest – posttest design and represents the first direct attempt to control the threats of the external validity. This design may be diagrammed as shown below:

R	O_1	X	O_2
R	O_3		O_4
R		X	O_5
R			O_6

It is clear from this diagram that in this design four-groups are randomly set by the experimenter. In this design two simultaneous experiments are conducted and, hence the advantages of replication are available here. The effect of X treatment

is replicated in four ways: $O_2>O_1$, $O_2>O_4$, $O_5>O_6$ and $O_4>O_3$. This design makes it possible to evaluate the main effects of testing as well as the reactive effect of testing, thus increasing the external validity or generalisibility. The factorial analysis of variance can be used as the appropriate statistical test. Because the design is complex from the methodological as well as the statistical point of view, it is less preferred to the above two true experimental designs.

Self Assessment Questions

True or False

1) Random assignment of the subjects is necessary for the control group design. T/F

2) Control group design has a strong level of external validity. T/F

3) Pretest Posttest designs are most preferred method to compare the participants groups as compared to posttest only, control group design. T/F

2.5 TWO FACTOR DESIGN

Until now, only those designs were considered in which the researcher studied the effect of one independent variable. Forthcoming discussion focuses on true experiments with factorial design in which two variables or factors are manipulated simultaneously. Experiments in which two or more variables are manipulated are designed as factorial experiments. Factorial experiments are the expansion of very popular post test design to study two independent variables simultaneously. These expanded true experiments are called factorial experiments.

A factorial design is often used to understand the effect of two or more independent variables upon a dependent variable. Factorial experiments permit researchers to study behaviour under conditions in which independent variables, called in this context factors, are varied simultaneously. Thus, researchers can investigate the joint effect of two or more factors on a dependent variable.

The factorial design also facilitates the study of interactions, illuminating the effects of different conditions of the experiment on the identifiable subgroups of subjects participating in the experiment. A factorial design is which two or more variables, or factors, are employed in such a way that all the possible combinatiosn of selected values of each variables are used. In the simplest case we have two variables, each of which has two values or level. This is known as two-by-two (2*2) factorial design because of the two levels of each variable. The 2*2 design makes four combinations that you will understand via underneath layout:

Layout of 2*2 Factorial Designs

Factor A (Arousal level)

Factor B (Task complexity)	**A1 (high)**	**A2 (low)**
B_1 (simple) B_2 (complex)	$A_1 B_1$ $A_1 B_2$	$A_2 B_1$ $A_2 B_2$

Let us take an example to illustrate the meaning of factorial design.

Suppose the experimenter wants to know about how do the level of arousal and task difficulty affect the task performance. Obviously, there are two independent variables or factors. One is 'arousal level' and the other is 'task complexity'. You can denote the first independent variable as A and second independent variable as B.

The dependent variable is task performance. Further, suppose the arousal level is manipulated in two ways: high arousal and low arousal - these are two levels of A. Let the high arousal be A_1 and low arousal A_2. Similarly the task complexity is manipulated in two ways: Simple and Complex Task. Let the simple task be called B_1 and the complex task be called B_2. Now you see that both independent variables have been manipulated in two ways. The resulting factorial design is 2*2.

In the simplest form, with two levels of each independent variable there would be four groups of randomly assigned participants. They would receive treatments that represent all possible combinations of the two levels of arousal high and low and the two levels of task complexity simple and complex. This design is known as a 2*2 factorial experiments with 2*2=4 groups in all. In the notation system we have been using all along, the design for this factorial experiment could be diagrammed as follows.

G_1 R X_{A1B1} O_1
G_2 R X_{A1B2} O_2
G_3 R X_{A2B1} O_3
G_4 R X_{A2B2} O_4

The hypothesised outcome of this study would be $O_2 > O_1$ and $O_3 > O_4$. That is, the prediction would be that performance on the simple task would be better under conditions of high arousal, while performance on the complex task would be worse under conditions of higher arousal – an interaction or interactive effect of the two independent variables.

Factorial experiments can also be represented in another way. Our hypothetical experiment, with two independent variables each represented by two levels, could be diagrammed as follows:

		Task Complexity A	
		$Simple_{A1}$	$Complex_{A2}$
Arousal Level B	Low_{B1}	G_{A1B1}	G_{A2B1}
	$High_{B2}$	G_{A1B2}	G_{A2B2}

The four cells in this 2*2 table represent the four possible combinations of treatments in 2*2 factorial experiments.

2.5.1 Main Effect and Interaction Effect

To understand the technical term main effect and interaction effect, it is necessary to present the mean values for the four experimental conditions which are given below. These are hypothetical data to illustrate the main and interaction effect.

2*2 Factorial Design on Arousal Level and Task Complexity

		Task Complexity A		Raw Means (Effect of B)
		Simple (A_1)	Complex (A_2)	
Arousal Level B	Low (B_1)	9.0	11.8	10.4
	High (B_2)	6.2	14.4	10.3
Column Means (Effect of A)		7.6	13.1	

You can see that data in two left cells are performance of condition A_1 that is, the two simple task. Data in two cells on the right side are the performance of condition of A_2 that is, the two complex task. Therefore, we can average the data in the two left cells and find average performance to simple task is 7.6, as shown below the left column. Similarly, averaging the data in the two right cells gives the average performance to the complex task, 13.1. Because 7.6 and 13.1 were obtained by averaging the columns of the table, they are called the *column means*. Looking at the column mean, we find that the complex task appear to have taken more time than simple task. Therefore, it can be concluded that complex task takes more time.

The effect of arousal level on performance in terms of time taken can be seen by looking at the rows of the table. The two upper cells shows the performance of condition B_1 and the two lower cells show the performance of condition B_2. Averaging across the rows, you find that average performance in the low arousal condition was 10.4 and the average for the high arousal was 10.3. Because 10.3 and 10.4 are obtained by averaging across the rows of the table they are called the *rows means*. From the rows means it can be concluded that arousal difference makes no difference at all to performance but when arousal combines with the task complexity it is clear that arousal makes a big difference. However, the nature of that difference becomes clear only when both independent variables are taken into account.

It is now obvious that the factorial designs tell us the effect of each independent variable individually. It indicates effect of arousal on performance and the effect of task complexity on performance. These are the effects we would observe in separate univariate experiments. These effects are known in statistical terms as the main effects of independent variables. A main effect is the effect of one independent variable averaged across the levels of the other independent variable.

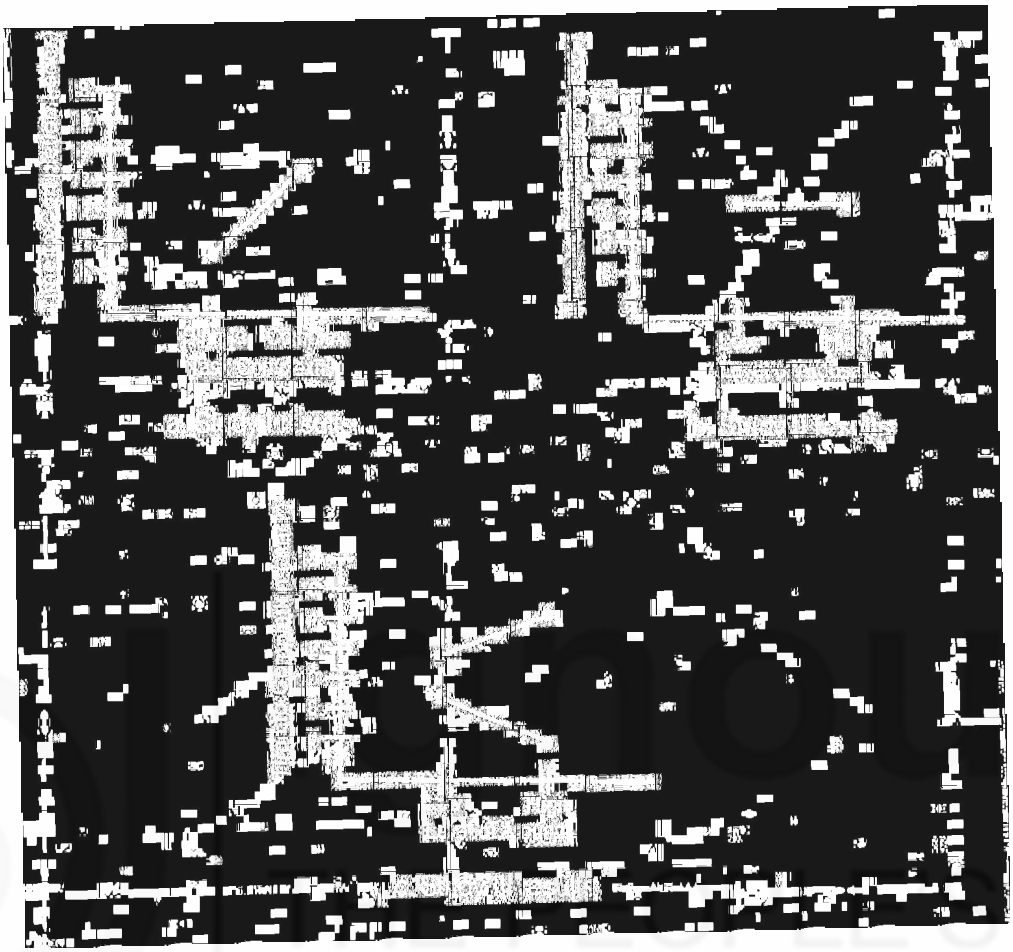
Factorial design also tells us about the joint effect of two independent variables or interaction between the two variables. These variables interact if effect of one variable depends on the level of the other. You can see the interaction in the above cited example here because effect of arousal depends on the task complexity.

(refer to graphs given below)

2.5.2 Graphical Presentation of the Main Effects and Interaction Effect

The main effects are the task complexity and level of arousal and the interaction effect is the combination of task complexity and level of arousal.

Main Effect of Task Complexity **Main Effect of Level of Arousal**



Interaction Effect of Task Complexity and Level of Arousal

On Task Performance in Terms of Time and Completion

(http:// www.psychstat.missouristate.edu/multibook/mult09.htm)

Fig. 1 : Graphical Representation of Main Effect and Interaction Effect

Interpretation

Graph of study 1 and study 2 shows the main effect of task complexity and level of arousal on performance in terms of time taken. It is clear from the study1 results that complex task takes more time than simple task and study 2 results reveals that arousal level makes no difference on performance. Further, one point might be clarified by looking at the graph rather than tables of mean concerns the concept of an interaction. The graph for study 3 shows the interaction between task complexity and arousal. The fact that the two lines on that graph, for the simple and complex task groups, are not parallel to one another suggests that there is an interaction. Whether the line diverge, converge, or even cross, whenever they aren't parallel, the variables interact. If the lines are parallel, it shows absence of a statistical interaction,

2.5.3 Two Factor, Multi-Level Factorial Design

The type of factorial design that we have discussed above is one in which there

are two independent variables, each having two levels. Hence, it was referred to as a 2*2 factorial design. Likewise, a factorial design with two independent variables may be of a 3*2, 3*3, 4*3, 4*4 etc. In this way a generalised factorial design for two independent variables may be written as K*L factorial design in which K stands for the first independent variable and L stands for the second independent variable. The value of K and L indicates the number of ways in which the first and the second independent variables have been manipulated. These ways are known as levels of the independent variable. Thus, a 3*2 factorial design indicates that the first independent variable has three levels and the second independent variable has two levels. In this design there will be six experimental conditions. A 3*3 design similarly indicates that each of the two independent variables has three levels.

Self Assessment Questions

1) Factorial designs are used to study the main effect and interaction effect of two or more independent variables. T/F

2) Main effect of one variable is the effect of one variable averaged over our all the levels of other variables. T/F

3) Through the raw means and column means researcher can explain the interaction effect of independent variable. T/F

4) When the two lines are not parallel on the graph it indicates that there is no interaction. T/F

5) In 2*2 factorial design, there are two independent variable and each having two levels. T/F

6) When effect of one independent variable depends on the level of another variable it is known as

   a) Main effect

   b) Reaction effect

   c) Interaction effect

   d) Joint effect

7) Which of the following is an advantage of controlled experimental design

   a) Findings are easily applied to settings outside the laboratory.

   b) They always use random sampling in choosing research participants.

   c) They rarely need to be evaluated with respect to ethical concerns.

   d) They provide a strong basis for drawing causal inferences.

8) Which statement is not correct in relation to factorial design

   a) Factorial design is a kind of non-experimental design

   b) Two or more independent variables are manipulated in all possible combinations.

   c) The factorial design enables the experimenter to study the independent and interactive effect of two or more independent variable.

   d) In factorial design as far as possible two groups of subjects is preferred.

9) If the experimenter wants to study the independent effect as well as interactive effect of two or more independent variable. Then he uses

   a) Solomon four group design

   b) Randomized one way Enron design

   c) Factorial design

   d) Pretest posttest control group design

10) Which one of the most suitable statistical test is used in randomized block design?

   a) t-Ratio

   b) ANOVA

   c) Pearson r

   d) Multivariate analysis

2.6 USES OF FACTORIAL DESIGN

Factorial Designs can be used to:

- Identify which factors have the most important effects on the response.
- Decide whether further investigation of a factor's effect is justified.
- Investigate the functional dependence of a response on multiple factors simultaneously (if and only if you test many levels of each factor).
- Find out whether specified factors influence response to a given treatment
- See whether two factors interact with each other.
- Optimise response in screening experiments.
- Reduce the chance of missing an effect because the chosen material is insensitive.

2.7 ADVANTAGES AND DISADVANTAGES OF FACTORIAL DESIGN

The factorial experiments have several advantages over single independent variable experiment:

1) In a factorial design two or more than two independent variables are simultaneously manipulated whereas in a single independent variable experiment as its name implies a separate experiment is designed to study the effect of independent variable. Thus a factorial experiment provides economy of time labour and money.

2) The factorial experiment also permits the evaluation of interaction upon the dependent variable. In a single independent variable experiment one cannot evaluate the effect of the interaction of the independent variables because only one independent variable is manipulated at a time.

3) The experimental results of a factorial experiment are more comprehensive and can be generalised to a wider range due to the manipulation of several independent variables in one experiment. From this point of view the single IV experiments suffer a major setback.

4) In factorial experiments there is an additional gain occurring due to the hidden replication arising from the factorial arrangement itself.

Disadvantages

Despite these advantages, factorial design has some disadvantages which are as follows:

1) Sometimes the experimental setup and the resulting statistical analysis become so complex that the experimenter may wish to drop this design and return to a single IV experiment. This is especially true when more than three independent variables each with three or more levels are to be manipulated together.

2) In factorial experiments when the number of treatment combinations or treatments becomes large, it becomes difficult for the experimenter to select a homogeneous experimental unit (or subject).

3) Sometimes, it happens that some treatment combinations arising out of the simultaneous manipulation of several independent variables becomes meaningless. Then, the resources spent in those combinations are simply wasted.

2.8 LET US SUM UP

The overall blueprint of the experiment is called experimental design. Basic elements of experimental design are choice or existence of control group and allocation of the subjects randomly to both the groups. Factors, levels, condition, treatment, main effect and interaction effect are the basic terms which are used in experimental design. Broadly true experiments are classified into the two categories i.e. single factor design and two factor design. Control group designs are used as true experiments in psychological research. Control group provides a standard against which to compare the effect of the particular variable. Post test only, equivalent control group design and pretest posttest control group design are the major types of control group design. Control group designs are mostly used when the researcher wants to study the effect of one or two independent variable on the dependent variable.

A factorial design uses all combinations of two or more independent variables, each having at least two levels. Factorial designs are employed when one wants to study the interaction effect of two or more independent variables. A factorial design may save time by studying more than condition per experiment or it may be used when ruling out more than one rival hypotheses or when one is interested in possible interaction between the independent variables. In a factorial experiment, the main effect of one variable is the effect of that variable averaged over all the levels of the other variables. An interaction exists between two independent variables when [independent]. Variable A has a different effect on the dependent variable when it is combined with one level of [independent] variable B than with another level of B. If the graph of a factorial experiment has non parallel lines; there is an interaction between the variables.

2.9 UNIT END QUESTIONS

1) Explain experimental design method in research? Discuss the basic elements and types of experimental design.

2) Differentiate between pretest only, control group design and pretest posttest control group design.

3) Describe factorial design method in research? Discuss 2*2 factorial design with relevant examples.

4) Explain the meaning of following in context of experimental design;
   a) factor
   b) levels
   c) main effects
   d) treatment

5) Discuss the contraction of interaction with examples.

6) How many variables? And how many levels of each would be investigated in the following factorial design.
   a) 2*2
   b) 2*4
   c) 2*3

7) Write advantages and disadvantages of factorial design.

Answer to SAQs

True of False: 1. (T), 2. (F), 3. (T), 4. (T), 5. (T), 6. (F), 7. (F), 8. (T)

Multiple choice: 1. (c), 2. (d), 3. (a), 4. (c), 5. (b)

2.10 SUGGESTED READINGS

Campbell D.T & Stanley, J.C (1963). *Experimental and Quasi-Experimental Designs for Research.* New York: Russell Sage Foundation.

Kirk, R.E. (1968). *Experimental Design: Procedures for the Behavioural Sciences*. Belmont: Calif Brooks/Cole.

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UNIT 3 SURVEY DESIGN

Structure

3.0 Introduction

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3.0 INTRODUCTION

"Every method of data collection, including the survey, is only an approximation to knowledge. Each provides a different glimpse of reality, and all have limitations when used alone. Before undertaking a survey the researcher would do well to ask if this is the most appropriate and fruitful method for the problem at hand. The survey is highly valuable for studying some problems, such as public opinion and worthless for others".

(Source: *'Donald P. Warwick and Charles A. Lininger')*

You may assume someone hands you a sheet of paper full of questions. The first reads: "I would like to learn your opinion of the course materials provided by the IGNOU. Would you say it is (a) well organised, (b) adequately organised or (c) poorly organised?" You probably would not be shocked by this. It is a kind of survey and most of us are normally encountered with such set of questions.

Knowing what people want is the key factor to success in any type of organised efforts. NGOs, News, media, government departments, and political candidates need to know what people think. Associations need to know what their members want. Large companies need to measure the attitudes of their employees. The best way to find this information is to conduct a survey. The survey research design is very valuable tool for assessing opinions and trends. If survey design is well-structured, one can obtain an accurate representation of opinion.

This unit is intended primarily for those who are keen to learn and do survey research. It discusses how to design a valid survey, what are the steps involved in survey design and how to administer it to a representative sample of the respondents. This unit begins with the description of what you want to learn. (Establish the goals of survey design) whom you will interview (determine the sample), how you will interview (interviewing methodology), what you will ask (questionnaire designing), pre-test the questions and finally analysing results with final reports.

3.1 OBJECTIVES

After reading this unit, you will be able to:

- Explain the various steps of survey design;
- List advantages and disadvantages of various kinds of interviewing methodology for survey;
- Select appropriate mode of administering survey;
- Know the techniques and procedure of sampling;
- Design a good questionnaire and know the method of administering the questionnaire; and
- Know how to analyse the questionnaire.

3.2 SURVEY RESEARCH DESIGNS

Survey research studies large and small populations (or universe) by selecting and studying selected sample populations to discover the relative incidence, distribution and interrelations of sociological and psychological variables. The social scientific nature of survey research is revealed by the nature of its variables, which can be classified as sociological facts and opinions and attitudes. Sociological facts are attributes of individuals, for example; sex, income, political and religious affiliatation, socio-economic status, education, age, occupation, caste and so on.

The second type of variable is psychological and includes opinions and attributes on one hand and behaviour on the other. The survey researcher is not interested primarily in the sociological variables as such. He is primarily interested in what people think and what they do. The sociological variables are then related in some manner to the psychological variables. The census and public opinion polls conducted by various agencies are good examples of survey.

Surveys can also be used to test hypotheses about the relationships among variables. One may try to find out the effects of some event on people's behaviour. For example, surveys have been conducted after the Tsunami hits Chennai to find out impact of Tsunami on people's lives.

3.3 STEPS IN SURVEY DESIGN

Survey researchers use a "flow plan" or chart to outline the design and subsequent implementation of a survey . These steps and the flow chart are presented below.

Phase-1

Establishing goal

- Develop hypotheses
- Decide on type of survey (mail, interview, telephone)
- Write survey questions
- Decide on responses categories
- Design layout
- Plan how to record data

Phase-2

Sample and Sampling Plan

- Select sample
- Decide on target population
- Get sampling frame
- Decide on sample size

Phase-3

Structuring and Designing the Questionnaire

- Questionnaire design
- Questionnaire construction
- Questionnaire wording
- Pre Test the questionnaire

Phase-4

- Interviewing methodology
- Interviewing methodology
- Conduct interviews
- Carefully record data

Phase-5

Data Analysis

- Enter data into computers
- Recheck all data
- Coding and tabulation

- Perform statistical analysis on data

Phase-6

Final Report

- Describe methods and findings in research report
- Present findings to others for critique and evaluation

The flow plan starts with the objective with the survey and ends with empirical measurement data analysis in final report. The above phases are being elaborately dealt with below.

3.3.1 Establishing the Goals of Survey Project

The first step in any survey is deciding what you want to learn. The goals of the survey project determine whom you will survey and what you will ask them. If goals are unclear the results will probably be unclear. First the general and specific problems that are to be solved are as carefully and as completely stated as possible. For example, an educational investigator is interested to study the attitudes of the community members towards the school system. While discussing the general problem the investigator notes down a number of the more specific problem such as: Is the attitude of the members of the community affected by their having children in school? Are their attitudes affected by their educational level? Most important job of the investigator is to specify and clarify the problem in this regard.

The researcher should also have specific questions to ask that are aimed at various facets of the problem. Each of these questions should be built into the interview schedule. Some survey researcher even designs tables for the analysis of data at this point in order to clarify the research problem and to guide the construction of interview questions.

3.3.2 Sample and Sampling Plan

The next step in the flow plan is the sample and the sampling plan.

There are two main components in determining whom you will interview. The first is deciding what kind of people to interview. Researchers often call this group the target population. If you conduct an employee attitude survey or an association membership survey, the population is obvious. If you are trying to determine the likely success of a product, the target population may be less obvious. Correctly determining the target population is critical. If you do not interview the right kinds of people, you will not successfully meet your goals.

The next thing to decide is how many people you need to interview. Statisticians know that a small, representative sample will reflect the group from which it is drawn. The larger the sample, the more precisely it reflects the target group. The Survey System includes a sample size calculator that can help you decide on the sample size.

Surveys differ greatly in value according to how the respondents are the sampled. In understanding surveys researcher defines the study population and draws the sample. Researcher use different procedure for sampling. They can use random sampling in which every member of population has an equal and independent chance for being included in the sample. Usually the researchers use the stratified random sampling. Under this system the universe is first divided into number of

strata or groups then from each strata or group certain numbers of the items are taken on a random basis. Sometimes groups are selected by using cluster or grouping from a larger population. This is known as cluster sample.

Besides these probabilities sampling, surveyor also uses different kinds of non probability samples such as: haphazard sample, purposive sample and convenient sample. In the best survey research, random samples are used because of their high cost and greater difficulties of execution. Random samples are often bypassed for quota samples. In a quota sample, "representativeness" is presumably achieved by assigning quotas to interviewers that is, so many men and women, so many boys and girls, and so on. Quota sampling should be avoided in the behavioural survey research, because while it may achieve representativeness, it lacks virtue of random sampling.

Self assessment Questions

Multiple choice questions

1) In random sample?
   a) Each subject has the equal chance of being included
   b) Selected subjects are taken
   c) Subjects are taken according to merit
   d) None of these
2) Which sampling method does not ideally represent the population?
   a) Quota sampling
   b) Random sampling
   c) Cluster sampling
   d) Stratified sampling
3) For five categories of books the researchers within each category, chooses only three titles and then computes statistical tests on the resulting data) This is an example of
   a) Discrete sampling
   b) Stratified sampling
   c) Random sampling
   d) Selective sampling

3.4 STRUCTURING AND DESIGNING THE QUESTIONNAIRE

After deciding target population, the next large step in a survey design is a construction and designing the questionnaire to be used. Designing a questionnaire is a surprisingly complex procedure that involves a great many considerations. It shares many of the other considerations of research design in addition to the concerns that are inherent in any written or oral form of communication. Frequently researchers use existing questionnaires rather than designing their own instruments.

Thus they avoid redesigning the wheel and they compare their results with those of previous studies using the same instrument. The considerations listed in the following sections will be helpful whether you design your own questionnaire or select an existing one.

3.4.1 Determine the Purpose of the Questionnaire

The first question to ask when designing a questionnaire is the same as for any research. What do you expect to accomplish? It is important to mention this here because beginning researchers sometimes tend to design and administer a questionnaire without thinking purpose of the survey.

Suppose the students in the college are concerned about campus security. Some one might design and administer a questionnaire that shows the students are, in fact, concerned about the problem. This is not particularly useful information. What would be useful is information about what specific things could be done to improve campus security: increasing the frequency of patrols by police, providing an escort service, reducing the number of entrances to buildings, or installing an electronic security system. In this way, the administration would know what changes would be acceptable to the college community and be given some guidance in deciding how best to allocate resources to improve campus security.

3.4.2 Determine the Type of Questions

Questionnaire, as used in Behavioural researches, can be classified on the basis of two dimensions – (a) type of response required and (b) type of questionnaire administration. Based upon the type of responses required survey questions may be classified into two categories:

i) Closed ended or fixed response Questions

ii) Open ended Questions

Closed Ended or Fixed response Questions: As its name implies, fixed response questions consists of statements of questions with a fixed number of options or choices. The respondent is asked to check the option or response that best fits or suit him. A few statements illustrating fixed response questions are as under:

Do you feel shy in talking to the members of the opposite sex?	Yes/No
Do you like to entertain members of the opposite sex in a club?	Yes/No
Do you like to have a member of the opposite sex as one of your shopping partners?	Yes/No

One of the basic assumptions to be made behind the use of fixed response questionnaire is that the target sample has an adequate knowledge of the subject matter of the questionnaire. Another assumption is that the researcher has enough knowledge about the sample under investigation so that he can easily anticipate what kinds of responses are likely to be given.

Open-ended Questions: Open-end questions consist of questions that require short or lengthy answers by the respondents. An open ended question permits the respondents to answer in their own words. . The following examples are as under:

What are the causes of student unrest?

What methods do you recommend for improving discipline on the university campus?

Open-ended Questions are harder to code, however, because the answers are in narrative form, it is necessary to categorize responses in some way to summarize the data. This must be done after the survey is complete.

In the construction of the questionnaire, attention is devoted to increase the respondents' cooperation and avoid misunderstanding of the questions. First, the questionnaire format should be presentable, not too densely packed, and it must be attractive and clear. This involves using intelligible contingency ("if no/yes go to...") questions, or matrix questions that contain all the items or response options to a question.

Second, the effects of the order in which questions have to be posed, has to be considered, and this can be pre-tested with different questionnaires, and by being sensitive to the research problem.

Third, clear instructions on how to answer the questions should be given, and it is best to divide the questionnaire into different sections that are each preceded with instructions.

3.4.3 Determining the Wording of the Questions

The wording of the question should equally enhance the unambiguous nature of the questionnaire. Several options are available depending on the research perspective: attitudes, for instance, can be measured with Likert scale questions (variation from strongly disagree to strongly agree). Questions can also be open-ended (and coded by the researcher for analysis) or closed-ended (an exhaustive list of mutually exclusive alternatives).

Note that open-ended questions may pose problems for analysis (too many responses), while closed-ended questions may impose too rigid a framework on the respondents. Also, each statement should not be too long, not negatively phrased, and posed in neutral, unambiguous terms to avoid social desirability effects and bias in any one (pro/con) direction. Also avoid double-barreled questions, and make sure to ask comprehensible and relevant questions.

3.4.4 Determine Order of Questions

In a questionnaire the order of the individual questions is of great significance because the order tends to influence the validity of the obtained answers as well as the refusal rates (Cantril, 1944; Whitfield, 1950). In the beginning the respondent is unsure of himself as well as curious. So the opening questions should be simple, general and such as to put the respondent at ease. This has a natural effect of establishing rapport between the investigator and the respondent. No sensitive question or embarrassing question should be asked and there should be no personal question either because it is likely to lead to refusal to answer. Then the question should move from the general to specific aspect in a logical manner. Ordinarily no break should be given in moving from general to specific questions. But where the break becomes essential the investigator should explain the significance of the break and the new set of questions should follow in one or two sentences.

If at all the sensitive questions or embarrassing or personal questions have to be asked, it should be placed in or near the end so that if refusal is met relatively only a few questions are left unanswered.

Kahn & Cannell (1957) have recommended that it is most wise to start with some broad questions relating to the topics and then gradually narrowing down to the specific questions. They have named such a sequence of questions as a funnel sequence. Currently the funnel sequence of questions has become the standard norm for questionnaire in behavioural researches.

3.4.5 Pre-Test the Questionnaire

When preparing a questionnaire, the researcher thinks ahead as to how he or she will record and organise the data for analysis. He or she pilot tests the questionnaire with a small group of respondents similar to those in a final survey. If interviewers are used the researcher trains them how to use the questionnaire and collect the data. He or she asks the respondents in the pilot test whether the questions were clear and explores their interpretations to see whether his or her intended meaning was clear. This kind of test can reveal unanticipated problems with question wording, instructions to skip questions, etc. It can help you see if the interviewees understand your questions and give useful answers.

3.5 INTERVIEWING METHODOLOGY

After designing and construction the questionnaire researcher must decide on method of data collection. There are many methods of reaching the target group but all have advantages and disadvantages. A detailed discussion of each of them is presented below :

3.5.1 Personal Interview

Personal interview are also known as the survey interview is one in which a direct conversation between the interviewer and the respondent is held with a view to elicit some information from the respondent.

In a (more time-consuming and expensive) interview survey, sensitive and complicated issues can be explored face-to-face. This method also ensures a higher response rate, and a reduction of "don't know" answers. The interviewer has more control over the data collection process and can clarify unclear questions in a standardised way. Since the questionnaire is the main measurement instrument, the interviewer must make sure that the questions have identical meaning to all respondents: interviewers should (and are trained to) be familiar with the questionnaire, dress like the respondents, behave in a neutral way during the interview, follow the given question wording and order, record the answers exactly, and probe for answers. Interview surveys typically have a higher response rate (affecting generalisability).

3.5.2 Telephone Surveys

Surveying by telephone is now also a popular interviewing method in metro cities of India. This is made possible by nearly universal coverage. Mobile phones in India are now being used for telephone surveys.

Advantages

People can usually be contacted faster over the telephone than with other methods. If the Interviewers are using CATI (computer-assisted telephone interviewing), the results can be available minutes after completing the last interview. You can dial random telephone numbers when you do not have the actual telephone numbers of potential respondents.

CATI software, such as The Survey System, makes complex questionnaires practical by offering many logic options. It can automatically skip questions, perform calculations and modify questions based on the answers to earlier questions. It can check the logical consistency of answers and can present questions or answers choices in a random order.

Skilled interviewers can often elicit longer or more complete answers than people will give on their own to mail, email surveys (though some people will give longer answers to Web page surveys). Interviewers can also ask for clarification of unclear responses.

Some software, such as The Survey System, can combine survey answers with pre-existing information you have about the people being interviewed.

Disadvantages

Many telemarketers have given legitimate research a bad name by claiming to be doing research when they start a sales call. Consequently, many people are reluctant to answer phone interviews and use their answering machines to screen calls.

The growing number of working women often means that no one is home during the day. This limits calling time to a "window" of about 6-9 p.m. (when you can be sure to interrupt dinner or a favorite TV program).

You cannot show or sample products by phone.

3.5.3 Mail Survey

As its name implies a questionnaire consisting of several items that are designed to elicit the required information is prepared and mailed to the respondents with the request to return it after answering all the items. Thus the mail questionnaire appears to be a direct means for obtaining information from every respondent.

Advantages

Mail surveys are among the least expensive. This is the only kind of survey you can do if you have the names and addresses of the target population, but not their telephone numbers. The questionnaire can include pictures – something that is not possible over the phone. Mail surveys allow the respondent to answer at their leisure, rather than at the often inconvenient moment they are contacted for a phone or personal interview. For this reason, they are not considered as intrusive as other kinds of interviews.

Disadvantages

Mail surveys take longer time than other kinds. You will need to wait several weeks after mailing out questionnaires before you can be sure that you have gotten most of the responses.

In populations of lower educational and literacy levels, response rates to mail surveys are often too small to be useful. This, in effect, eliminates many immigrant populations that form substantial markets in many areas.

Even in well-educated populations, response rates vary from as low as 3% up to 90%. As a rule of thumb, the best response levels are achieved from highly-educated people and people with a particular interest in the subject (which, depending on your target population, could lead to a biased sample).

One way of improving response rates to mail surveys is to mail a postcard telling your sample to watch for a questionnaire in the next week or two. Another is to follow up a questionnaire mailing after a couple of weeks with a card asking people to return the questionnaire. The downside is that this doubles or triples your mailing cost. If you have purchased a mailing list from a supplier, you may also have to pay a second (and third) use fee, as you cannot buy the list once and re-use it. The bulk mail moves slowly, increasing the time needed to complete your project.

3.5.4 Computer Direct Interviews

These are interviews in which the Interviewees enter their own answers directly into a computer. They can be used at malls, trade shows, offices, and so on. The Survey System's optional Interviewing Module and Interview Stations can easily create computer-direct interviews. Some researchers set up a Web page survey for this purpose.

Advantages

Through computer direct interviews, you will get more accurate answers to sensitive questions. Recent studies of potential blood donors have shown respondents were more likely to reveal HIV-related risk factors to a computer screen than to either human interviewers or paper questionnaires. The National Institute of Justice has also found that computer-aided surveys among drug users get better results than personal interviews. Employees are also more often willing to give more honest answers to a computer than to a person or paper questionnaire.

Different interviewers can ask questions in different ways, leading to different results. The computer asks the questions the same way every time, thus reducing interviewer bias.

Ensuring skip patterns are accurately followed. The Survey System can ensure people are not asked questions they should skip based on their earlier answers. These automatic skips are more accurate than relying on an Interviewer reading a paper questionnaire. Response rates are usually higher. Computer-aided interviewing is still novel enough that some people will answer a computer interview when they would not have completed another kind of interview.

Disadvantages

The Interviewees must have access to a computer or one must be provided for them.

As with mail surveys, computer direct interviews may have serious response rate problems in populations of lower educational and literacy levels. This method may grow in importance as computer use increases.

3.5.5 Email Surveys

Email surveys are both very economical and very fast. More people have email than have full Internet access. This makes email a better choice than a Web page survey for some populations. On the other hand, email surveys are limited to simple questionnaires, whereas Web page surveys can include complex logic.

Advantages

An email questionnaire can gather several thousand responses within a day or two. There is practically no cost involved once the set up has been completed.

You can attach pictures and sound files. The novelty element of an email survey often stimulates higher response levels than ordinary "snail" mail surveys.

Disadvantages

You may possess or purchase a list of email addresses. Some people will respond several times or pass questionnaires along to friends to answer. Many programs have no check to eliminate people responding multiple times to bias the results. The Survey System's Email Module will only accept one reply from each address sent the questionnaire. It eliminates duplicate and pass along questionnaires and checks to ensure that respondents have not ignored instructions (e.g., giving 2 answers to a question requesting only one). Many people dislike unsolicited email even more than unsolicited regular mail. You may want to send email questionnaires only to people who expect to get email from you. You cannot use email surveys to generalise findings to the whole populations. People who have email are different from those who do not, even when matched on demographic characteristics, such as age and gender.

Email surveys cannot automatically skip questions or randomize question or answer choice order or use other automatic techniques. Many citizens still do not possess email facilities, especially older people and those in lower income and education groups. So email surveys do not reflect the population as a whole. At this stage they are probably best used in a corporate environment where email is common or when most members of the target population are known to have email.

3.5.6 Internet/Intranet (Web Page) Surveys

Web surveys are rapidly gaining popularity. They have major speed, cost, and flexibility advantages, but also significant sampling limitations. These limitations make software selection especially important and restrict the groups you can study using this technique.

Advantages

Web page surveys are extremely fast. A questionnaire posted on a popular Web site can gather several thousand responses within a few hours. Many people who will respond to an email invitation to take a Web survey will do so the first day, and most will do so within a few days. There is practically no cost involved once the set up has been completed. Large samples do not cost more than smaller ones. Some Web survey software can show pictures, video and play sound. Web page questionnaires can use complex question skipping logic, randomizations and other features not possible with paper questionnaires or most email surveys. These features can assure better data.

Web page questionnaires can use colours, fonts and other formatting options not possible in most email surveys. A significant number of people will give more honest answers to questions about sensitive topics, such as drug use or sex, when giving their answers to a computer, instead of to a person or on paper. On average, people give longer answers to open-ended questions on Web page questionnaires than they do on other kinds of self-administered surveys.

Some Web survey software, such as The Survey System, can combine the survey answers with pre-existing information you have about individuals taking a survey.

Disadvantages

1) Current use of the Internet is far from universal. Internet surveys do not

reflect the population as a whole. This is true even if a sample of Internet users is selected to match the general population in terms of age, gender and other demographics.

2) People can easily quit in the middle of a questionnaire. They are not as likely to complete a long questionnaire on the Web as they would be if talking with a good interviewer.

3) Depending on your software, there is often no control over people responding multiple times to bias the results. At this stage we recommend using the Internet for surveys mainly when your target population consists entirely or almost entirely of Internet users. Business-to-business research and employee attitude surveys can often meet this requirement. Surveys of the general population usually will not.

4) Another reason to use a Web page survey is when you want to show video or both sound and graphics. A Web page survey may be the only practical way to have many people view and react to a video. In any case, be sure your survey software prevents people from completing more than one questionnaire. You may also want to restrict access by requiring a password (good software allows this option) or by putting the survey on a page that can only be accessed directly.

Self Assessment Questions

1) Which surveys are the fastest method for obtaining the response?

   a) email survey

   b) telephone survey

   c) male survey

   d) interview survey

2) A questionnaire in which the respondent is free to answer in their own words is known as

   a) open-ended questions

   b) close-ended questions

   c) partially open questions

   d) neutral questions

3) A questionnaire consists of statements of questions with a fixed number of options or alternative is known as:

   a) open-ended questions

   b) close-ended questions

   c) partially open question

   d) neutral questions

4) A sample in which every member of population has an equal chance of being selected is called

   a) quota sample

b) random sample

c) stratified random sample

d) cluster sample

5) Which survey method is most expensive?

a) telephone

b) email

c) interviews

d) web page

True/False

1) Questionnaire are standardized test. (T/F)

2) Interviews can be structured as well as unstructured. (T/F)

3) A random sample from population is not necessary to get good survey data. (T/F)

4) Personal interviews are most expensive than other survey methods. (T/F)

5) Order of questions should move from specific to general aspect in a logical manner. (T/F)

6) Socially desirable answers should be avoided. (T/F)

3.6 DATA ANALYSIS

The fifth phase of 'survey design flow plan' is analytical. The responses to questions are coded and tabulated. Coding is the term used to describe the translation of question responses and respondent information to specific categories for purposes of analysis. Coding can mean the analysis of factual response data and then assignment of individuals to classes or categories, or the assigning of categories to individuals, especially if one is preparing machine cards for machine analysis. Such card consists of a large number of columns with a number of cells in each column. For example, the fifth column may be assigned to sex and first two cells of the column, or the numbers 0 and 1 used to designate female and male.

Tabulation is simply the recording of the numbers of types of responses in the appropriate categories after which statistical analysis follows: percentages, averages, relational indices and appropriate tests of significance.

3.7 FINAL REPORT

In the last phase of the survey design, the analysis of the data are studied, collated, assimilated, and interpreted. Finally the results of this interpretative process are reported.

3.8 LET US SUM UP

Survey research design is a valuable tool for assessing opinions and trends. Designing a survey is a complex procedure that shares components of research

design. Survey design starts with the objective of the survey and ends with the final report. After establishing the goals, surveys may use different types of sampling techniques i.e. random sampling, stratified random sampling, cluster sampling. Designing the questionnaire is a laborious and difficult task for the researcher. The steps in designing the questionnaire are to determine its purpose, types of questions, order of questions, questions wording and pre test the questionnaire. . Methods of survey administration include personal interview, telephone survey, mail surveys, computer direct interview, email surveys and internet surveys etc. Each has advantages and disadvantages. After data collection, responses to questions are coded, tabulated, interpreted and finally reported.

3.9 GLOSSARY

Random Sample : a sample in which every member of the population has an equal and independent chance of being selected.

Stratified Random Sample : a random sample in which two or more subsamples are represented according to some predetermined proportion generally in the same proportion as they exist in the population.

Cluster Sample : group selected by using clusters or groupings from a larger population.

Open Ended Questions : one that the respondents answer in their own words.

Close Ended Questions : one that limits the respondents to certain alternatives.

Mutually Exclusive : categories defined so that membership in one rules out membership in other.

CATI : (Computer-assisted telephone interviewing) survey research telephone interviewing in which the interviewer sits before a computer screen and keyboard, reads from the screen questions and enters answers directly to the computers.

Social Desirability Bias : a bias in survey research in which respondents give a "normative" response or a socially acceptable answer rather than a honest answer.

Funnel Sequence : organising survey research questions in a questionnaire from general to specific questions.

Likert Scale : A question that asks for a rating of extent of agreement or disagreement.

Double Barreled Question : A survey question that contains more than one issue and can create respondent confusion for ambiguous answers.

Quota Sampling : A non probability sampling method in which the investigator recognises the different strata of population and from each stratum he selects number of individuals arbitrarily.

3.10 UNIT END QUESTIONS

1) What is a survey design? Give its characteristics?

2) Discuss the various steps in survey design?

3) Put forward in detail how will you structure a questionnaire

4) What is meant by interviewing methodology elaborate?

5) What are the important aspects to be kept in mind in data analysis and writing up the final report?

Answer to SAQs

Multiple choice: 1(a), 2(a), 3(b), 4(a), 5(a), 6(b), 7(b), 8(c)

True or False: 1(F), 2(T), 3(F), 4(T), 5(F), 6(T)

3.11 SUGGESTED READINGS

Kerlinger: *Research Methods in Behaviour Research*, New Age International, New Delhi.

Katz & Katn: *Research Methods*, Sage Publication, New Delhi.

UNIT 4 SINGLE SUBJECT DESIGN

Structure

4.0 Introduction

4.1 Objectives

4.2 Single Subject Design: Definition and Meaning

4.3 Phases Within Single Subject Design

4.4 Requirements of Single Subject Design

4.5 Characteristics of Single Subject Design

4.6 Types of Single Subject Design

- 4.6.1 Withdrawal Design
- 4.6.2 A-B Design Paradigm
- 4.6.3 A-B-A Design Paradigm
- 4.6.4 A-B-A-B Design Paradigm

4.7 Alternative Treatment Design

- 4.7.1 Multiple Baseline Design
- 4.7.2 Changing Criterion Design

4.8 Advantages of Single Subject Design

4.9 Disadvantages of Single Subject Design

4.10 Let Us Sum Up

4.11 Glossary

4.12 Unit End Questions

4.13 Suggested Readings

4.0 INTRODUCTION

While majority of contemporary research is based on group designs, the history of psychology contains numerous examples of significant research contributions based on the observation of single organisms. For example, the early investigation of the physiology of behaviour by Hippocrates, Galen, Muller, Broca and others led to the discovery of the functions of the various portions of the brains and the role of the endocrine system in behaviour. Furthermore, the procedures developed for the study of perceptual phenomena were based on extensive observations of individual subjects.

Other examples of significant contributions to the psychological literature based on the observation of individual subjects would include Ebbinghaus identification of several basic principles of memory using himself as subject, Pavlov's development of the history of classic conditioning based on his observations of individual laboratory dogs and Freud's development of psychoanalytical theory, which he based on his studies of individual clients. More recently, B.F Skinner has been the most prominent psychologist to use the intensive study of individual organisms as the basis of theory development. However, not all experiment uses the group of subjects. Single subject research has been a popular method of research in the experimental analysis of behaviour as well as other area of research such as drug evaluation and behaviour therapy.

This unit begins with meaning and description of single subject design. The phases within the single subject design along with requirement of single subject design are then given. This is followed by the details of some basic strategies for achieving control in experiment using single subject design such as withdrawal design, alternative treatment design, multiple baseline design and changing criterion design. Moreover, you will find the various types of withdrawal design. Finally, several advantages and disadvantages of single participation approach are pointed out.

4.1 OBJECTIVES

After reading this unit, you will be able to:

- Define single subject design;
- Discuss the various phases involved in single subject design;
- Explain basic types of Single Subject Design together with advantage and disadvantage;
- Tell others the different paradigms of Single Subject Design used in withdrawal design;
- Explain which type of strategy for achieving control in single subject experiment can be employed in different situations; and
- Enlist the advantage and disadvantage of Single Subject Design.

4.2 SINGLE SUBJECT DESIGN: DEFINITION AND MEANING

Single subject designs are thought to be a direct result of the research of B.F. Skinner who applied the techniques of operant conditioning to subjects and measured the outcomes at various points in time. Because of this, single subject designs are often considered the design of choice when measuring behavioural change or when performing behavioural modification. Rather than comparing groups of subjects, this design relies on the comparison of treatment effects on a single subject or group of single subjects.

Single-subject design or **single-case research design** is a research design most often used in applied fields of psychology, education, and human behaviour in which the subject serves as his/her own control, rather than using another individual/group. Researchers use single-subject design because these designs are sensitive to individual organism differences vs group designs which are sensitive to averages of groups. Often there will be large numbers of subjects in a research study using single-subject design. Since the subject serves as their own control, this is still a single-subject design. These designs are used primarily to evaluate the effect of a variety of interventions in applied research.

According to Nelson and Martella (1999) Single-subject research is experimental rather than correlational or descriptive, and its purpose *is* to document causal, or functional, relationships between independent and dependent variables. Single subject research employs within and between subjects comparisons to control for major threats to internal validity and requires systematic replication to enhance external validity (Nelson & Martella,1999).

According to Gay & Airasian (2003) Single Subject Research Designs (also referred to as single-case experimental designs) are designs that can be applied

when the sample size is one or when a number of individuals are considered as one group. These designs are typically used to study the behavioural change an individual exhibits as a result of some treatment. In single-subject designs, each participant serves as her or his own control, similar to a time-series design. Basically, the participant is exposed to a non-treatment and a treatment phase and performance is measured during each phase.

In general, single-subject research is a method of testing hypotheses. Generally such research is used to test the hypotheses that a particular treatment will tend to have an effect on one or more Behaviour. Single subject research designs are very useful in clinical research particularly in the area of Behaviour modification and drug evaluation.

4.3 PHASES WITHIN SINGLE SUBJECT DESIGN

Baseline: This phase is one in which the researcher collects data on the dependent variable without any intervention in place.

Intervention: This phase is one in which the researcher introduces an independent variable (the intervention) and then collects data on the dependent variable.

Reversal: This phase is one in which the researcher removes the independent variable (reversal) and then collects data on the dependent variable.

It is important that the data are stable (steady trend and low variability) before the researcher moves to the next phase. Single-subject designs produce or approximate three levels of knowledge: (1) descriptive, (2) correlational, and (3) causal.

Self Assessment Questions

1) Define single subject design and mention its major features.

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2) What are the various phases within single subject design? Give suitable examples.

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4.4 REQUIREMENTS OF A SINGLE-SUBJECT DESIGN

The following are requirements of single-subject designs:

Continuous assessment: The behaviour of the individual is observed repeatedly over the course of the intervention. This insures that any treatment effects are

observed long enough to convince the scientist that the treatment produces a lasting effect.

Baseline assessment: Before the treatment is implemented, researcher to look for behavioural trends. If a treatment reverses a baseline trend (e.g., things were getting worse as time went on in baseline but the treatment reversed this trend) then this is powerful evidence suggesting (though not proving) a treatment effect.

Variability in data: Because behaviour is assessed repeatedly, the single-subject design allows the researcher to see how consistently the treatment changes behaviour from day-to-day. Large-group statistical designs do not typically provide this information because repeated assessments are not usually not taken and the behaviours of individuals in the groups are not scrutinized; instead, group means are reported.

4.5 CHARACTERISTICS OF SINGLE SUBJECT DESIGN

McMillan (2004) has summarized five characteristics of single-subject research:

1) **Reliable measurement**: Since these designs involve multiple measures of behaviour, it is important for the instrumentation to be reliable. Conditions for data collection, such as time of day and location, should be standardised, and observers need to be trained. Consistency in measurement is especially crucial in the transition before and after the treatment.

2) **Repeated measurement**: The same behaviour is measured over and over again. This step is different from most experiments, in which the dependent variable is measured only once. Repeated measures are needed to obtain a clear pattern or consistency in the behaviour over time. They control for the normal variation of behaviour that is expected within short time intervals. This aspect of single-subject designs is similar to time series studies, which investigate groups rather than individuals and do not provide for a return to conditions that were present before the treatment was implemented.

3) **Description of conditions**: A clear, detailed description of the conditions of measurement and the nature of the treatment is needed to strengthen internal and external validity.

4) **Baseline and treatment conditions**: Each single subject study involves at least one baseline and one treatment condition. The baseline refers to a period of time in which the target behaviour (dependent variable) is observed and recorded as it occurs without a special or new intervention. The baseline behaviour provides the frame of reference against which future behaviour is compared. The term baseline can also refer to a period of time following a treatment in which conditions match what was present in the original baseline. The treatment condition is a period of time during which the experimental manipulation is introduced and the target behaviour continues to be observed and recorded. Both the baseline and treatment phases of the study need to be long enough to achieve stability in the target behaviour.

5) **Single-variable rule**: During a single-subject study, only one variable should be changed from baseline to treatment conditions. In some studies two variables are changed together during the same treatment condition. This is an interaction in single-subject research.

Self Assessment Questions

1) What are the requirements of single subject design? Give examples.

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2) What are the characteristics of a signle subject design?

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4.6 TYPES OF SINGLE SUBJECT DESIGN

In single subject experiment research the following four types of basic designs are commonly used:

- Withdrawal design
- Alternating treatments design
- Multiple baseline design
- Changing criterion design

4.6.1 Withdrawal Design

As the name implies the experimental treatment that is introduced following a baseline period is then withdrawn. The treatment can be systematically presented and withdrawn in several ways. The basic logic is to establish an operant level, introduce the independent variable, note any changes in response rate, withdraw the independent variable to see if response rate returns to operant level and so forth. Sometimes the withdrawal design is erroneously referred to as a reversal design. Thus, reversal refers to the removal and withdrawal of the treatment variable that is applied following the baseline period; i.e. "reversing" back to baseline. There are three commonly used types of paradigms of withdrawal design given as underneath:

4.6.2 A-B Design Paradigm (1 baseline and 1 treatment phase)

The A-B single case design evolved from the case study and is the simplest strategy by which to systematically observe individual behaviour with and without the presence of an experimental treatment. In the A-B design the dependent variable or target behaviour is operationally defined and measurements of this behaviour are made throughout the study. During the A phase of the investigation, baseline observations are made of the behaviour being studied to determine the frequency of occurrence. During the B phase the treatment variable is introduced and nay changes in the dependent variable are noted and attributed to the independent variable. In a clinical setting the A-B design could be used to study

the effects of shock therapy in the treatment of drinking problem. The A phase (baseline) would be the amount of alcohol consumed by the patient before treatment. During the B phase the patient would be offered a choice between alcohol and non-alcoholic beverage. If the subjects chose the alcohol then a mild electric shock would be delivered. The results indicated that the patient decreased alcohol consumption.

The weakness of this design is that it lacks internal validity. It is possible that an extraneous variable could be responsible for the changes observed during phase B. Thus this design should be used only when other designs are not possible.

4.6.3 A-B-A Design Paradigm (baseline (A) treatment (B) and baseline (A)

One revision of the basic A-B single case design is the A-B-A design. In this design, a baseline is established during the first A phase, a treatment is introduced during phase B, and a second baseline is recorded after the withdrawal of the treatment. If a behaviour increases or decreases upon introduction of the treatment variable and then returns to its baseline during the second A phase, then it may be concluded that there is a relationship between the independent (treatment) and dependent (behaviour) variables. The example of shock treatment for an alcoholic patient could also be extended for an A-B-A design by adding a second A phase in which the patient is no longer shocked for selecting alcohol.

The major advantage of the A-B-A design is that there is a greater chance of identifying confounded extraneous variable that are responsible for observed changes during the B phase.

The weakness of A-B-A design is that it doesn‘t completely control for extraneous variables. Secondly the effect of manipulation may not be fully reversal. For example some IVs can’t be withdrawn– modeling or instructions (i.e. if I am measuring how many words you read per minute and then I give you instruction on how to better read I can’t really remove those instruction return to baseline because you will still remember them). Similarly some behaviours can’t be reversed - once given instruction you won’t forget how to read. Thirdly sequence effect may occur because prior treatment effects subsequent conditions on the subject.

4.6.4 A-B-A-B Design Paradigm (Baseline-Treatment-Baseline-Treatment):

This is also known as repeating treatments. When intervention is reintroduced after the withdrawal phase, this results in A-B-A-B design which in fact, is analogous to the equivalent time samples design (a kind of quasi-experimental design). In this design, operant level or baselines (A) and interventions (B) each is repeated twice. According to this design the behaviour may change from the first baseline (A) to intervention (B) where upon it may decrease following withdrawal of B (Second A) and, finally the behaviour may again increase with the introduction of the intervention (B). As a consequence of this, the functional relationship between the intervention (B) and the behavioural measures is strengthened. Thus, A-B-A-B provides a better opportunity for careful examination of intervention effect than the simple A-B-A design.

The weakness of this design is the same as ABA design i.e. irreversibility and sequence effect.

Self Assessment Questions

True/False

1) Single case design are useful in clinical setting. T/F
2) Single phase design is a correlational design rather than experimental or descriptive. T/F
3) AB design lacks internal validity. T/F
4) Phase length should be approximately as longer as baseline. T/F
5) To reduce carry over effect researcher uses longer phases of treatment. T/F

Answers: 1. (T), 2. (F), 3. (T), 4. (T), 5. (F)

Multiple Choice Questions

1) There is a greater chance of identifying confounded extraneous variables. This statement is true for:
   a) AB Design
   b) ABA Design
   c) ABAB Design
   d) ABABAB Design
2) Which type of withdrawal design lacks internal validity:
   a) AB Design
   b) ABA Design
   c) ABAB Design
   d) ABABAB Design
3) ABAB strategy is also known as:
   a) Time Series Design
   b) Equivalent Time Series Design
   c) Equivalent Time Samples Design
   d) Time Sample Design
4) Single Subject Designs are preferred because they are:
   a) Low Flexible
   b) Moderate Flexible
   c) Highly Flexible
   d) None of these
5) Researcher collect data on dependent variable without any intervention is called:
   a) Intervention
   b) Baseline
   c) Reversal
   d) Treatment

4.7 ALTERNATIVE TREATMENT DESIGN

A specific subclass of the A-B-A-B design is that in which there need be no baseline. Rather, A and B are two different treatments that are alternated randomly with a single individual-treatment A is thus withdrawn and replaced, not with a baseline, but with another treatment. The purpose for which the alternating treatments design is used is to attempt to evaluate the relative effectiveness of two or more treatments. For example, an extended series of treatments might be alternated in an A-B-A-B-A-B design in which A and B are two different methods for controlling the smoking habit. Over an extended period of time, one method might end up being relatively effective, while the other would not. In practical situations it could be seen that this kind of design, which has been increasingly used within recent years, has the advantage that treatment is being used without a withdrawal and return to baseline. It is only that two different treatments each are in effect 50 percent of the time.

The weakness of this design is that it creates interference between treatment phases therefore the treatment must sufficiently differ.

4.7.1 Multiple Baseline Design

As its name implies, in this design several baselines are simultaneously established prior to the administration of treatment. These designs are basically replication designs. In this design the effect of independent variables across several different behaviour emitted by the same participant is evaluated. The researcher, here takes several compatible behaviours that is, the behaviour that occurs simultaneously in the individual. He establishes baselines for each behaviour. Subsequently, a treatment is introduced for one target behaviour. If this behaviour changes following the treatment and other behaviour (control) remain stable at the baseline, the researcher concludes that the treatment is affecting behaviour. After some time the treatment is applied to the second target behaviour of the compatible behaviours and its effects are recorded. In this way the remaining target behaviour are subjected to treatment one after the other after some time. If the treatment is effective in changing the response rate following its administration to each of the target behaviour of the compatible behaviour, the researcher will have sufficient confidence in concluding about the effectiveness of the treatment. For example, researcher is trying to determine if rewarding a child with mental retardation for doing certain personal tasks is effective.

If the researcher begins rewarding tooth brushing, face washing, hand washing and hair combing all at the same time, it is possible that the presence of the experimenter, the attention received, or a spontaneous decision was responsible for the change. The researcher, however, could begin rewarding only tooth brushing the first week, tooth brushing and face washing the second week and so forth until after four weeks, all behaviours were being rewarded. This sequence would make it possible to see whether the increase in behaviour coincided with the reward.

The separate experiment baselines may be different behaviours in the same individual, as in this example, or the same behaviours in different individuals. The third possibility is to test the same behaviour in the same individual but in different behaviour settings. Multiple baselines designs are especially useful if the expected behaviour change is irreversible.

4.7.2 Changing Criterion Design

The basic strategy of the changing criterion design is that the effectiveness of a treatment is judged according to specified gradual changes in behaviour occurrence during the period of the intervention. The criteria are actual components of the intervention and specify that behaviour should change in increments to match changes in the criteria. Like other all single subject designs, the changing criterion design commences with a baseline phase (A) in which records are made of a single class of behaviour. The difference is that during the intervention there are several sub phases, each with different pre-established criteria. Assuming that a child is unable to sit still in class, the teacher may reward the child for sitting still for 5 minutes at a time until the performance becomes stable. Then the criterion may be set at 10 minutes, later at 15 and so forth. The behaviour at each criterion becomes the baseline against which to evaluate the effect of the manipulation at next criterion. Like the multiple baseline design, a changing criterion design is useful when the behaviour change is irreversible or when a return to the initial baseline is not possible.

4.8 ADVANTAGES OF SINGLE SUBJECT DESIGN

There are some advantages or strengths of single-subject experimental research. As such, this research is commonly conducted in psychology. Some of the main advantages are as follows:

1) The biggest advantage of single-subject research design is its ability to carry out a scientific investigation with only one subject (or sometimes two).

2) This advantage is more important for a psychologist than for other social scientists, because it saves much time in dealing with many subjects or large N research or between group researches and he is able to have full concentration on only one subject

3) Single-subject research design allows the researcher to control the experimental situation more effectively by establishing a good, obvious and continuous measure of the dependent variable (DV) throughout the experimental situation.

4) Such researches rarely require statistical tests to be performed for evaluation of data. Only through visual inspection the experimenter examines such factors as changes in the magnitude and rate of behaviours being studied (Kazdin, 1982). This point is a big advantage for those who dislike carrying out statistical computations

5) Both exploratory and descriptive researches can easily be carried out with single-subject design.

6) Single-subject research design allows the researcher to eliminate and hold constant extraneous variables that do not show up until after the investigation is under way. In fact, intra-subject comparison in case of single-subject research provides better control of extraneous variables than the intra-comparison, which is the case with large N experimental researches.

7) Single-subject designs are preferred because they are highly flexible and highlight individual differences in response to intervention effects. In general, single-subject designs have been shown to reduce interpretation bias for counselors when doing therapy.

4.9 DISADVANTAGES OF SINGLE-SUBJECT DESIGN

Research designs are traditionally preplanned so that most of the details about to whom and when the intervention will be introduced are decided prior to the beginning of the study. However, in single-subject designs, these decisions are often made as the data are collected. In addition, there are no widely agreed upon rules for altering phases, so, this could lead to conflicting ideas as to how a research experiment should be conducted in single-subject design.

The major criticism of single-subject designs are:

1) Carry-over effects: results from the previous phase carry-over into the next phase.

2) Order effects: the ordering (sequence) of the intervention or treatment affects what results

3) Irreversibility: in some withdrawal designs, once a change in the independent variable occurs, the dependent variable is affected this cannot be undone by simply removing the independent variable.

4) Ethical problems: Withdrawal of treatment in the withdrawal design can at times present ethical and feasibility problems.

5) Practical limitations: single subject research is time consuming research. It generally takes several fortnights or months to complete whereas much large end research design can be carried out in only one session.

6) Baseline Problems: Barlow & Herson (1984) have discussed many problems related to baselines in single subject research. One of the basic assumptions of single subject research is that stable baseline has been established. If baselines varies it is difficult for the researcher to conclude a reliable change in behaviour following treatment or intervention.

7) Researcher's Bias: Some biases on the part of a researcher are often seen on introducing the intervention or treatment. Generally the researcher waits for some cues indicating change in subject's Behaviour and then he introduces a withdrawal of the treatment. Such practices by the researcher are not scientific.

8) Lack of External Validity: Single-subject research in comparison to the between groups research or large N research has poor degree of external validity or generalisability. Since such an experiment is conducted only on one subject the conclusions obtained are difficult to be generalised to other participants

4.10 LET US SUM UP

Experiments using single subject have been performed for as long as psychology has been existing. Single subjects research has several advantages over group research. It focuses on individual performance that may be obscured by group research and it focuses on big effects avoiding ethical and practical problems in forming control groups and permitting greater flexibility in design. Basic control strategies in single- subjects research include withdrawal design, alternative treatment design, multiple baseline design and changing criterion design.

There are three types of paradigms which are used in withdrawal design i.e. AB design, ABA design and ABAB design.

The alternating treatments designs allows the evaluation of more than one than treatment without violating the rule that only one variable is changed at a time. First one treatment is given than the other in an alternating fashion. The multiple baseline design is an effective way of demonstrating that the manipulation caused the behaviour change. The manipulation is introduced at different times for different behaviours to see if the onset of behaviour change coincides with the manipulation for each behaviour. The changing criterion design introduces successively more stringent criteria for reinforcement over time. It is useful when the behaviour change is irreversible.

4.11 GLOSSARY

Baseline : the measure of behaviour before treatment that establishes a reference point for evaluating the effect of treatment.

AB Design : single-participant research design that consists of a baseline followed by a treatment. Also called a comparison design.

ABA Design : research design that includes a baseline period a treatment period and a subsequent withdrawal of treatment.

ABAB Design : an ABA design with treatment repeated after the withdrawal phase. Also called a replication design.

Alternating Treatment Design : a type of single participant design that allows the comparison of two different independent variables.

Multiple Baseline Design : research design that introduces experimental manipulation at different times for different Behaviours to see if Behaviour change coincides with manipulation.

Changing Criterion Design : research design that introduces successively more stringent criteria for reinforcement to see if Behaviour change coincides with the changing criteria.

Answers: 1. (b), 2. (a), 3. (c), 4. (c), 5. (b)

4.12 UNIT END QUESTION

1) What is meant by single-subject experimental research? Discuss the characteristics of single group design.

2) Discuss the different important designs of single-subject experimental research.

3) Point out the major strengths and weaknesses of single-subject experiment research?

4) Make distinction between baseline and intervention stage of single-subject experimental research.

5) What is the advantage of ABA design compare as to an AB design.

4.13 SUGGESTED READINGS

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UNIT 1 OBSERVATION METHOD

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1.0 INTRODUCTION

Observation of the behaviour of individuals, groups and organisations or their products/ outcomes is not only an essential aspect of human life; it also forms á basic method of scientific research in behavioural sciences. Specifically, it is useful in such fields as Developmental Psychology, Anthropology, Behaviour Modification, Social Psychology and Evaluation Research.

Observation can be used both in the laboratory as well as in naturalistic settings. Although behavioural scientists have largely used this method in the naturalistic settings it also forms a significant component of experimental (both field and laboratory) procedure. Indeed, in laboratory settings, careful Observation of subjects may not

only shed light on the limitations of the experimental procedures but also generate ideas for future research.

Observation involves looking and listening very carefully. We all watch other people sometimes, but we do not usually watch them in order to discover particular information about their behaviour. This is what Observation in Social Science involves. Observation is a complex research method because it often requires the researcher to play a number of roles and to use a number of techniques; including her/his five senses in order to collect data. In this unit we will be defining observation, understand how it is used as a method of research, we will also learn about the types of observation and the manner in which it is used as a tool of research. The procedure using observation as a tool for collecting data is also presented in this unit.

1.1 OBJECTIVES

After completing this unit, you will be able to:

- define the method of observation as a research tool;
- describe observation;
- explain the meaning of observation;
- elucidate the types of observation;
- analyse the data obtained from observation; and
- list out the advantages and disadvantages of observation method.

1.2 DEFINITION AND MEANING OF OBSERVATION

Observation has been defined as "the selection, provocation, recording and encoding that set of behaviours and setting/s concerning an organism 'in situ' which is consistent with empirical aims". Literally, Observation is a process of 'seeing' the things or events with naked eye with or without the use of any device to unravel the complexity of any phenomena to satisfy the demands of an empirical question.

Observation is way of gathering data by watching behaviour, events, or noting physical characteristics in their natural settings. Observations can be overt (everyone knows they are being observed) or covert (no one knows they are being observed and the observer is concealed).

The benefit of covert Observation is that people are more likely to behave naturally if they do not know they are being observed. However, you will typically need to conduct overt Observations because of ethical problems related to concealing your Observation.

Observation can also be either direct or indirect. Direct Observation is when you watch interactions, processes, or behaviours as they occur. For example, observing a teacher teaching a lesson from a Psychology curriculum to determine whether they are delivering it with fidelity. Indirect Observation is when you watch the results of interactions, processes, or behaviours. For example, observing the amount of plate waste left by students in a school cafeteria to determine whether a new food is acceptable to them.

1.2.1 The Diverse Situations in which Observation can be Used

The various situations in which observation as a method can be used are given below:

1) When you are trying to understand an ongoing process or situation. Through Observation, you can monitor or watch a process or situation that you are evaluating as it occurs.

2) When you are gathering data on individual behaviours or interactions between people.

3) Observation allows you to watch peoples' behaviours and interactions directly, or watch for the results of behaviours or interactions.

4) When you need to know about a physical setting, that is a setting or environment where something takes place can help increase understanding of the event, activity, or situation you are evaluating. For example, you can observe whether a classroom or training facility is conductive to learning.

5) When data collection from individuals is not a realistic option. If respondents are unwilling or unable to provide data provide data through questionnaires or interviews, Observation is a method that requires little from the individuals from whom you need data.

1.2.2 Planning the Observation

In planning observation of an event etc., the following points will have to be kept in mind.

1) *Determine the focus:* Think about the evaluation questions you want to answer through Observation and select a few areas of focus for your data collection. For example, you may want to know how well the Psychology curriculum is being implemented in the classroom. Your focus areas might be interactions between students and teachers', and teachers' knowledge, skills, and behaviours.

2) *Design a system for data collection:* Once you have focused your evaluation, think about the specific item for which you want to collect data and then determine how you will collect the information you need. There are three primary ways of collecting Observation data. These three methods can be combined to meet your data collection needs.

3) Recording sheets and checklists are the most standardised way of collecting Observation data and include both preset questions and responses. These forms are typically used for collecting data that can be easily described in advance (e.g., topics that might be covered in a Psychotherapy lesson).

4) Observation guides list the interactions, processes, or behaviours to be observed with space to record open-ended narrative data.

5) Field notes are the least standardised way of collecting Observation data and do not include preset questions or responses. Field notes are open-ended narrative data that can be written or dictated onto a tape recorder.

6) *Select the sites*: Select an adequate number of sites to help ensure that they are representative of the larger population and will provide an understanding of the situation you are observing.

7) *Select the observers*: You may choose to be the only observer or you may want to include others in conducting Observations. Stakeholders, other professional staff members, interns and graduate students, and volunteers, are potential observers.

8) *Train the observers:* It is critical that the observers are well-trained in your data collection process to ensure high quality and consistent data. The level of training will vary based on the complexity of the data collection and the individual capabilities of the observers.

9) Time your Observations appropriately: Programs and processes typically follow a sequence of events. It is critical that you schedule your Observations so that you are observing the components of the activity that will answer your evaluation questions. This requires advance planning.

1.2.3 Problems of Observation

1) **Selection of phenomenon for observation**

The problem of selecting a phenomenon for Observation becomes very real, especially when knowledge of the detailed movements of the observed is essential for an understanding of the behaviour under study. The researcher is not merely confronted with the problem of selecting the items of greatest importance from the mass of data or quantities of discrete phenomena. He/she has to be equally concerned with organising discrete entities in terms of the divergent concepts and orientations of the observers. Indeed, it is the observers who are expected to categorise them on the basis of varied concepts and their frames of reference thus providing an organisation to the incoherent jumble of the "real world". If the phenomena are not organised, the results are useless for understanding what has really occurred. Hence, it would be a difficult task for the researcher to evolve a theory which can effectively explain and predict behaviour.

Indeed, the problem of selecting phenomena for Observation is intricately related to the problem of conceptualisation. As the observers are bombarded by a vast quantity and 'wide array of stimuli, they are confronted with the baffling problem of choosing among them the phenomenon of greatest importance. This problem can be resolved, if the researcher himself/herself selects the phenomenon for Behavioural Observation prior to sending his observers to the fie1d.

2) **Observer inference**

The observer himself/herself is both a crucial strength and a crucial weakness in Behavioural Observation. He/she has to process the information stemming from his/her Observations and thereafter make inferences relating to complex constructs (e.g., aggression, hostility, leadership, conformity, etc.) He/she can meaningfully relate the observed behaviour to the variables under study. Of course, this requires that he/she possesses great powers of inference. The weakness of the observer is that he/she is likely to be influence by his/her own biases and, thus make incorrect inferences from his/her Observations. In conjunction with such personal biases, lack of knowledge of behaviour under study may also invalidate the Observation.

Besides, the observer-inference difficulty, in several social situations, merely the presence of an observer may influence the object of Observation. Indeed, people tend to act differently and even artificially when observed. They put their best foot forward and thus, behave in an exemplary way rather than in a customary way. People tend to adapt quickly to an observer's presence and behave as they would

actually behave. The observer can rule out the possibility of any influence of his/her presence by giving a feeling to the observed that he/she himself/herself is a "non-judgmental" person.

3) **Validity and reliability**

Validity and to some extent reliability are crucial problems in Behavioural Observation, especially when the researcher puts a heavy interpretative burden upon the observer. For example, in the Observation of self-oriented needs in conference behaviour, observers were provided a simple eleven-point rating scale ranging from "no expression of self-oriented need" to "all behaviour of the self-oriented type". They were asked to indicate integrated appraisals of group members' self-oriented needs. In addition to this, they were also required to make notes during conferences in terms of five categories of need expression: dependency, dominance, aggression, status-seeking and catharsis. There appeared a huge gap between the observed behaviours and the inferred needs. Thus, the validity problem intensified with the increasing burden of interpretation put upon the observers.

Another validity problem in the Behavioural Observation measures stems from the lack of their predictive power. There exist very rare independent behavioural measures of the same variables which can be used as criteria for Observation of constructs (i.e. needs). This problem can be resolved considerably by estimating construct validity of the Observation system with the help of a theoretical framework using deductive procedure.

The reliability problem of Observation is not a complex matter in behavioural science research. For practical purposes, reliability can be defined as the extent of agreement among observers. Thus, it can be estimated by correlating behavioural Observations of two or more observers. The reliability of observers regarding different categories of behaviour can be easily accessed by estimating the percentage of agreement between them. It can also be estimated by repeated reliability procedure as well as by using Analysis of Variance (ANOVA).

1.2.4 Ethical Issues in Observation

One of the major factors associated with observational studies is ethics. While Observation is generally seen as the least intrusive data collection method, it can also be an abuse of an individual's privacy. In observational research, the complexity of fieldwork in which the researcher is engaged "makes it difficult, if not impossible, to adopt a single set of standards." Spradley suggested that the researchers should follow the guidelines of the American Anthropological Association which include:

1) Study participants come first.

2) Their rights, interests, and sensitivities should be safeguarded by the researcher.

3) Participants must have the right to know the aims of the researcher.

4) The privacy of the participants must be protected.

5) The participant should not be exploited or harmed in any way.

6) Reports should be made available not only to sponsors but also to the participants and the general public.

1.3 CHARACTERISTICS OF OBSERVATION

The characteristics of observation can be put under various categories. The most important task of an observer is to classify behaviours into categories which must be precisely defined by the researcher. For example, to observe team-based managerial style, the research may use the following eight broad behavioural categories or dimensions which represent basic elements in the grid style proposed by Blake and Mouton.

Manager places high value on sound, creative decisions which results in understanding and agreement.

Manager seeks out ideas, opinions and attitudes different from his own.

Manager has strong convictions but responds to sounder ideas than his own by changing his mind.

Manager tries to identify reasons for conflict and seems to resolve underlying causes.

Manager contains himself when agitated and conceals his impatience.

Manager's humour fits the situation and gives the perspectives.

Manager retains a sense of humour even under pressure.

Manager exerts vigorous efforts and others join in.

It is necessary that the categories be exhaustive and mutually exclusive. They may embrace an extremely broad range to a completely narrow range of behaviour.

1.3.1 Units of Observation

The issue of unit of Behavioural Observation is still unresolved. By using small and easily observed and recorded units, the researcher may enhance reliability. However, by doing so, he/she is likely to damage the validity of his/her observation. That is, he/she may reduce the behaviour so much that it does not resemble the one being observed. The validity can be enhanced by using broad "natural" definitions. The clash between reliability and validity is related to the molar-molecular problem of measurement. While the molar approach involves larger behaviour wholes as unit of behaviour, the molecular approach relates to the smallest component of behaviour as a unit of observation.

In the molar approach, the observer may initiate his/her observation with a general variable and record varied behaviours under the one rubric. Thus, he/she has to rely on his/her own experience and interpretation of the meaning of the behaviour being observed. On the other hand, in the molecular approach, the observer sets aside his/her own experience and interpretation and records what he/she sees. For example, the molar observer may interpret the broadly defined "team-based management style" as "maximum concern for task and maximum concern for people". However, the molecular observer may use further fragmentation indicated in the eight categories cited earlier and, thus, take them as units of observation.

1.3.2 Degree of Inference

The extent of the observer inference also varies in terms of his/her approach. In a molecular approach, there is little scope for inference. The observer merely notes what the individual does or says. However, in actual practice, there are very few observation systems requiring a low degree of observer inference. Indeed, most researches use systems involving a high degree of inference on the part of observer.

In these systems, the observer is provided with designated categories demanding varying extents of interpretation of the observed behaviour.

For example, in the study cited earlier on self-need-oriented behaviour, the researchers require high degrees of observer inference. Although they have supplied and defined the five need areas, the observer is given ample latitude to infer that any particular behaviour is self-oriented. Of course, the wide freedom provided to the observer lowers the reliability of observation. This problem can be partly resolved by imparting specialised training to the observers. However, in this context, desirable course of action would be the use of a moderate degree of inference.

1.3.3 Generalisability or Applicability

The extent of generalisation or applicability of observation systems to other research situations varies considerably. On the one hand, there exist general observation systems which are designed for use with divergent research problems in different settings. The widely used Bales group interaction analysis can be cited as an example of such systems. This system involves a low degree of observer inference.

It provides twelve categories into which all verbal and, non-verbal group behaviour can be categorised. The examples of these categories are: "shows solidarity", "agrees", "asks for opinion", etc. The researcher classified these twelve categories into three larger sets: (a) social-emotional positive, (b) social-emotional negative, and (c) task-neutral. The example of the specific system is the study of self-oriented needs in discussion groups. Of course, it can also be used in situations other than decision-making conferences. It is true that most observation systems devised for specific situations can be suitably modified for use with other research problems.

1.3.4 Gaining Access and Leaving the Field

If the researcher is already a member of the group she/he is interested in studying, then gaining access is not a problem. The issues for these researchers are whether, when, and to whom to disclose oneself as a researcher. Despite well-planned research and/or particular interest in a group, gaining entry is not an easy process.

Time, effort, patience, and diplomacy are essential for success. In addition, maintaining that access is an ongoing process rather than a static one. Observation also requires researchers to consider how to "leave the field," although little attention has been paid to the process of disengagement.

When the study questions have been addressed or when data saturation becomes evident, most researchers know it is time to leave. How they leave—abruptly or gradually—is the major issue they have to address. External factors, such as termination of funding, personal health, or withdrawal of permission to continue the study, may precipitate abrupt termination of the study. Gradual departure may be more the norm when the researcher has adopted the complete participant or membership role. Researchers may have to return periodically to get questions answered or to complete unfinished business.

1.3.5 Length of Time in the Field

One of the unique factors of observation is the length of time in the field. Naturally, the amount of time depends on the research problem and the role assumed by the researcher. The researcher should have "prolonged personal contact with events in a natural setting" and play as many roles as necessary to "gain at least a comfortable degree of rapport and intimacy, with the people, situation, and settings of research."

1.4 SAMPLING

The crux of observational studies is the "who, what, where, and when" questions. The units of observation can be divided into two categories: molar and molecular. Molar involves observing large units of activity "as a whole," whereas the molecular approach "uses small and highly specific behaviours as the unit of observation". These two categories are not mutually exclusive. For example, the researcher may use the molar approach at the beginning of the study and change to the molecular one as her/his familiarity with, and understanding of, the insiders and their environment grows.

To get rich and in-depth information, it is important for the researcher to know the best times to observe and meet with individual insiders, as well as whom she/he should interview. Extended time in the field and active participation in the group's functions increases the researcher's ability to judge these things.

Researcher can also seek out insiders who "exemplify characteristics of interest" (called extreme case sampling), as well as those who have considerable experience in the group (called intensity sampling) because these people can help the researcher better understand the environment. Finally, the researcher may want to use snowball sampling as a way to link with others in a group. Snowball sampling is a good method to use because insiders who have been referred by a friend may be more willing to talk with the researcher.

1.5 DATA COLLECTION TECHNIQUES

The most common type of data collection techniques are logs and field notes. While the former are used to record daily conversations or events, field notes are much broader, more analytic, and more interpretive. The researcher may choose to write, or dictate into a tape recorder her/his field notes, which can be categorised as observational, method, theory, and personal. Observational notes detail what the researcher actually saw, while method notes include strategies that were employed or that might be employed in future observations.

Personal notes are the researcher's own feelings during the research process and theoretical notes are interpretative attempts to attach meaning to observations. In observation, the researcher uses all of her/his senses to gather information about the phenomena under study. A variety of material should also be used to enhance sensual observations.

Audio-recorders can be used to tape interviews. Video-recorders or cameras can be used to record the activities of the insiders. Other material such as minutes of meetings, memoranda, letters, magazines, or newspaper articles can also expand one's understanding of the study group. Maps can also be used to record observations.

Self Assessment Questions

1) What is Observation method? Discuss its relevance in Behavioural Science research.

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2) Examine the basic problems of Behavioural Observation. How can they be resolved?

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3) Elucidate the unique characteristics of Behavioural Observation.

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1.6 TYPES OF OBSERVATION

There are many types of observation methods available and these are listed below.

1.6.1 Casual vs. Formal Observation

Casual Observation often takes place during the initial stages of a research project. The researcher goes to the situation looking to find the categories and behaviours that will be used later in the formal observation stage. In the first stage, the researcher may also be considering factors such as the best place to stand, or the least obtrusive way to dress. When carrying out a Formal Observation, the researcher will have a clear idea of what behaviours they are looking for, and how they will be recorded. It is common, especially in laboratory situations, to record information on video, and then to analyse it in more detail later.

1.6.2 Direct vs. Indirect Observation

Observation can also be either Direct or Indirect. Direct Observation is when you watch interactions, processes, or behaviours as they occur. For example, observing a teacher teaching a lesson from a Psychology curriculum to determine whether they are delivering it with fidelity. Indirect Observation is when you watch the results of interactions, processes, or behaviours. For example, observing the amount of plate waste left by students in a school cafeteria to determine whether a new food is acceptable to them.

1.6.3 Unstructured Observation

The purpose of Unstructured Observation is to provide a "richer" and more direct account of the behavioural phenomenon under study. In these methods, attempts are made to analyse true complexities of the social situations rather than impose any structure over it. If required, in the light of the new knowledge, the definition of the problem can also be changed. The unstructured methods seek to generate rather than test the hypotheses. These are flexible in nature.

1.6.4 Participant Observation

Participant Observation is one of the most common methods for qualitative data

collection. It is also one of the most demanding techniques of observation. It requires that the researcher become a participant in the culture or context being observed. Participant Observation incorporates how to enter the context, the role of the researcher as a participant, the collection and storage of field notes, and the analysis of field data. Participant observation often requires months or years of intensive work because the researcher needs to become accepted as a natural part of the culture in order to assure that the observations are of the natural phenomenon.

When observing, you have to interpret what you see. This can be difficult especially when you are in a situation which is strange to you. For example, how might an outsider see a scuffle or an exchange of insult in a school playground? Remember that when you observe situations, you must understand what people's behaviour means to them. This is made easier if you are actually joining in with the people or situation you are observing. It is unlikely that you will have enough time to get accepted into a group of people you are completely unfamiliar with, so participant observation might be better used in a group or situation you already have some contact with, for example, attitudes at work.

Although Participant Observation is marked by varying extents of contact and involvement with the participants, the observer attempts to maintain a face-to-face relationship with them throughout the period of observation. He may be relatively passive (i.e. uninvolved and detached) as well as active (i.e. share experiences). However, this hampers objectivity as the observer may be emotionally involved in the group. Therefore, it is desirable that the researcher starts only with a tentative hypothesis which can be subsequently modified. Unlike other methods, Participant Observation combines both data collection and analysis phases of research. The observer can synthesise them while taking field notes. Lofland provides a series of guidelines to accomplish this synthesis:

- He is required to make mental notes of what is observed;
- He has to jot down important events, words or quotes which are susceptible to memory lapses;
- As soon as possible, he is advised to prepare full field notes by converting mental and jotted down notes into running log of observations;
- He must get the field notes typed with at least two copies; and the original can be kept as a chronology of the observation.
- The field notes usually embrace information pertaining to:
- Participants (i.e. age, sex, official designation, group membership, etc.);
- The setting (i.e. a conference room, a factory canteen, a slum dwelling, etc, and its social characteristics);
- The purpose of the situation (i.e. official, chance, goal congruence, etc.);
- The social behaviour (i.e. cause, objective, goal, activity, quality effects, etc.);
- Frequency and duration of the behavioural situation (i.e. when, how long, how frequently, etc.).
- Thus, field notes consist of a running portrayal of participants, events, settings and behaviours.
- Field notes should be as concrete as possible. This requires the observer to record what actually took place rather than make any inferences about behaviour.

For example, he is required to record that the trade union leader was "shouting" (rather than "angry") when he entered the room of the industrial relations manager. Of course, whenever the observer happens to record his own inferences, analyses and feelings, he must clearly indicate so in his field notes. Once the full field notes are prepared, the researcher is required to refine the analysis by reorganising the field notes into different files maintained by him. Usually, the researcher may use this information for generating (rather than testing) hypotheses and theories. Indeed, Participant Observation itself is more relevant at the hypothesis development phase rather than the hypothesis testing phase of research which involves quantitative methods.

1.6.5 Specimen Records

Specimen records are used to describe behaviour in its natural context and in its original sequence. By using this somewhat selective method, the observer tends to describe behaviour continuously over relatively short time spans making relevant inferences. Specimen records can be very comprehensive. For example, the specimen record of behaviour of one boy's life during a single day ran into 420 pages.

In this method, the observer makes both objective as well as inferential statements. The inferences are made while the behaviour is being recorded. The objective of making such inferences is to describe the intentions of the observer. By using this method, the researcher seeks to understand the behavioural phenomenon by analysing records of molar behaviour in a particular environmental setting.

The molar behaviour involves the "whole" individual rather than his particular aspects. The behavioural settings delineate the boundaries and, thus, focus on one of the basic observational units. The researcher attempts to describe the behaviour in such varied units. By doing so, he is able to demonstrate consistency of behaviour within particular behaviour settings.

1.6.6 Anecdotes

Anecdotes are used most frequently by social scientists and teachers to describe behaviour in natural settings. In this method, the observer is required to observe and accurately record the behaviour of interest in all its details. This is a highly selective method as researcher usually selects the events of interest beforehand.

Thus, the researcher may collect Anecdotes relating to an individual's understanding of his organisational culture in work setting. As compared to Specimen Records, the Anecdotes are more comprehensive. The Anecdote records are written after the occurrence of the behavioural incident and can be classified and quantified. Notwithstanding their major contribution to hypothesis and theory generation, Anecdotes can also be used in the process of testing a. hypothesis by adhering to some system of time sampling.

1.6.7 Structured Observation

Structured Observation is a set of formal techniques which seek to provide sympatric description of behaviour and test causal hypotheses. As the researcher already understands "what" is relevant for research purposes, he is in a better position to evolve a specific plan beforehand for making and recording Observation. In these observational techniques, there is focus on specified aspect of behaviour which takes place both in the field as well as laboratory. There are two types of such techniques:

1.6.8 Checklists

Checklists represent a popular Structured Observation method. Simple checklist enables the observer to systematically record the presence of a specified behaviour or condition. Checklists can be classified as Static and Action Checklists. Static Checklists involve recording of such Observation as sex, age and other characteristics of the environment. Action Checklists are concerned with the recording of actual behaviour. Thus, the observer may be required to simply tally whether or not the behaviour took place. In checklist, the behaviour is defined explicitly and operationally to facilitate a quick and accurate categorisation of behaviour. There can be various schemes of categorising behaviour. In general, there exist two types of formats:

1) **The Sign Checklist System:** In this system or analysis approach, a series of specific acts or events is already listed beforehand. These acts or events may or may not take place during the Observation period. The observer merely goes on tallying the frequency of occurrences of varied behaviour (i.e. "laughing", "asks questions", "seeks clarification" etc.). The observer is required to look for the occurrence of behaviour given in the checklist rather than categorise it. This system is useful for studying important but infrequent behaviours.

2) **Category System of Checklists:** In this system or analysis approach, the observer is required to place each unit of behaviour in one and only one category which is, of course, mutually exclusive, independent and exhaustive. This system merely indicates whether a given behaviour (as defined by a particular category) has occurred without showing the degree or intensity of its occurrence. These systems can be classified as Discrete and Continuous Category Systems.

Discrete Category Systems despite having only one dimension, contain discrete categories which cannot be located in relationship to each other on a very clear continuum. This type of category system can be illustrated by the problem-solving behaviour: supporting, proposing solution, goal- setting and developing. It is not possible to locate such categories on a single, clear continuum.

On the other hand, Continuous Category Systems are so devised that the categories within them can be placed along a single and clear continuum. This type of category system can be illustrated by the playground behaviour of children. Aggressive behaviour in this case may be coded in three categories ranging from mild aggressive behaviour to severe aggressive behaviour as follows: mild verbal attack, verbal threats and threatening gestures and distinct physical attack.

1.6.9 Rating Scales

Rating Scales are used in observational studies to assess the quality of some experience or activity. Regardless of their objective, these scales are frequently used in either of two ways:

To record behaviour at frequent intervals throughout a sample of social interaction.

To rate the nature of the entire social events after it has completed.

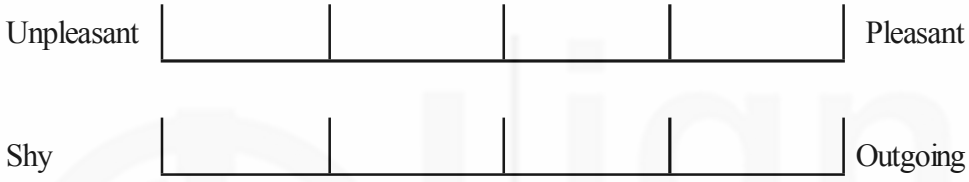
They are found in one or a combination of three basic forms:

1) **Numerical Rating Scale:** Numerical Rating Scales are employed by behavioural science researchers to record quantified observations of behaviour of individuals, the activities of an entire group, the change in the situation surrounding them and allied data. Although these scales are less reliable and provide more superficial

information than category systems, they are sometimes relied upon for practical considerations. Numerical scales involve a series of points which depict varying extents of the dimensions being observed. The numerical scales are simple to construct, easy to use and convenient in data analysis. However, they are more susceptible to varied biases and errors than other types of rating scales.

2) **Forced-Choice Rating Scale:** The Forced-Choice Rating scale may be in varied forms. Usually, it presents two equally favorable statements about the observed. The observer is required to choose only one of the two statements to describe him. Thus, he may be forced to indicate, whether the individual has more of one quality than another of the given pair. For example, "He is energetic" and "He is intelligent".

3) **Graphic Rating Scale:** The Graphic Rating Scale is in the form of a straight line representing a thermometer and presented either horizontally or vertically. The observer is required to make a judgment which frequently reflects either positively or negatively on the observed. An example of this scale is as follows:



1.6.10 Shortcomings of Rating Scales

Rating scales are susceptible to certain pitfalls:

1) *Halo Effect*: It refers to the tendency on the part of the observer to rate the observed on several qualities according to the general impression (or general mental attitude) he has about him. For example, if a person appears to be sociable, he may be rated as intelligent.

2) *Error of Leniency:* It is the tendency on the part of an observer to overestimate (or underestimate) the desirable qualities of the observed when he likes (or dislikes) him for certain reasons.

3) *Error of Central Tendency:* It takes place when the observer is unable to assign extreme ratings and thus, tends to provide moderate ratings to the observed.

4) *Logical Rating Error*: It refers to the tendency on the part of the observer to assign ratings to the observed for qualities which appear logically related in his own mind (which may not be true otherwise).

5) *Mechanical Observation:* In several situations, Observation is conducted by mechanical devices rather than human beings. Mechanical Observation involves use of videotape traffic counters and other machines for recording behaviour. Researchers tend to use a motion picture camera and time-lapse photography in some unusual Observation studies. These techniques can be used in research to help design store layouts and resolve problems relating to people or objects moving through different spaces over time. An example of a well-known research project involving Mechanical Observation is the AC Nielsen Television Index (NTI). It uses a Consumer Panel and Mechanical Observation to accomplish

ratings for television programmer. They have selected a representative sample of 2000 households in the United States population. These households have agreed to install "people meters" in their homes and become the members of consumer panels. These meters monitor constantly, recording the time a television set is turned on, how long it remains on, which members of the households witness televisions and the channel choices.

Thereafter, these data are fed to the company's central computer via telephone lines. This arrangement helps in obtaining programme ratings and demographic profiles of particular programme audience for advertisers and networks.

Business researchers also tend to use other mechanical devices to assess physical and physiological reactions to different stimuli. These devices include: eye-tracking monitors, pupilometers, pychogalvanometers and voice pitch analysers. However, recently, with the development of systems such as optical scanners and bar codes, it is possible to research inventory levels, shipments, etc. in factories, warehouses and transpiration companies.

1.7 ADVANTAGES AND DISADVANTAGES OF OBSERVATION

Advantages of Observation Method

1) Observation allows the researcher to study people in their natural setting/s without their behaviour being influenced by the presence of a researcher.

2) Observation data usually consists of detailed information about particular groups or situations. This kind of data can fill out' and provide a deeper, richer, understanding than survey work which tends to produce less detailed information about a large number of people.

3) A lot of what people do, they "take for granted'; they do it 'naturally', they aren't aware of it.

4) Some methods only allows for the study of one individual at a time. Observation enables the research to study groups of people together, that is, it allows for the study of interaction between the members of a group.

5) An interview, for instance, only show a person's views at one time. Observation involves the study of groups or situations over time, thus, revealing changes.

6) Some groups of peoples, such a school truants, may not agree to cooperate with methods of research such as interviews. Sometimes Observation is the only way of finding out about such groups.

7) Collect data where and when an event or activity is occurring.

8) Does not rely on people's willingness or ability to provide information.

9) Allows you to directly see what people do rather than relying on what people say they did.

Disadvantages of Observation Method

1) Susceptible to observer bias and observer inference.

   Susceptible to the "Hawthorne Effect," that is, people usually perform better

when they know they are being observed, although indirect Observation may decrease this problem.

2) Can be expensive and time-consuming as compared to other data collection methods.

3) Does not increase your understanding of why people behave as they do.

1.8 GUIDE FOR OBSERVATION METHOD

Carefully consider what kind of observation might be useful for your research:

What groups or situations would be relevant?

Is it possible and practical to observe them?

Should you use direct or participant Observation?

What could you find out from the Observation?

Make any arrangements necessary for the Observation to take place.

Ask for permission well in advance if you want to arrange a visit?

Plan on which day or days the Observation will take place and how long it will last.

Plan the headings you will use for your notes on Observation.

Decide exactly what you are trying to find out and work out suitable headings to make notes under the following:

If you are doing participant Observation you will have to decide whether to

a) Remain 'hidden'– not tell anyone that you are observing them

b) Be 'open'- tell people that you are observing them

c) Do the Observation

d) Make sure you are properly prepared with paper, pen and a clear idea of what you are looking for.

e) Make sure you make the notes as the Observation is occurring or immediately afterwards so that you do not forget what happened.

f) Look and listen very carefully

g) Remember to try not to influence the behaviour of the people you are observing, so be careful how you take notes.

h) Analyses and write up the results of your Observation, that is look through the notes and work out what you discovered.

i) Write up your Observation including (i) How and why you planned the Observation as you did (ii) How the Observation went, including problems you had doing it (iii) what was discovered and how this relates to other aspects of your research.

j) How would you organise the Observation differently if you were to do it again?

1.9 LET US SUM UP

The literature on Observation reveals that it is a very complex, challenging, and creative method. Observation method differs from other methods in that it requires the researcher to have more specialised training on how to observe, what and how to record the data, how to enter the field and leave it, and how to remain detached and involved at the same time. The fact that the researcher may have to assume one or more roles is unique to observational studies. There are, however, some similarities to other research methods such as the need to plan the overall project, review the literature, and determine who will be studied and when and where the Observation will take place. Finally, the uses of one's senses, as well as other data collection techniques, make Observation a more holistic type of research that allows the researcher to gain a better understanding of insiders from their own perspective.

1.10 UNIT END QUESTIONS

1) Evaluate briefly the diverse types of Observation methods with special focus on Participant Observation.

2) Carve out a befitting Observational Study scientifically.

3) Write short notes on:
   a) Specimen Records
   b) Checklists
   c) Rating Scales
   d) Mechanical Observation

1.11 SUGGESTED READINGS

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Kumar. R (2006) *Research Methodology*. New Delhi: Dorling Kingsley

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UNIT 2 INTERVIEW AND INTERVIEWING

Structure

2.0 Introduction

2.1 Objectives

2.2 Definition of Interview

2.3 Description of Interview

2.4 Types of Interview

- 2.4.1 General Interview Guide
- 2.4.2 Standardised Open Ended Interview
- 2.4.3 Closed Fixed Response Interview
- 2.4.4 Telephone Interview
- 2.4.5 Validating of Interview

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2.6 Interview Questions

- 2.6.1 Sequence of Questions
- 2.6.2 Stages of Interview
- 2.6.3 Procedure to be Followed during Interviewing

2.7 Convergent Interviewing as Action Research

2.8 Research Team

2.9 Let Us Sum Up

2.10 Unit End Questions

2.11 Suggested Readings

2.0 INTRODUCTION

The primary focus in interview is to find out answers to the problems related to the research topic. This is one method of collecting the data. This is an interactive process in which the interviewer or the researcher interacts with the respondent (interviewee) to elicit the needed information from the latter. It may be structured or unstructured and it may be a conversational type of interview. Either way the data is collected on the topic and the researcher may write the needed information in the questionnaire or interview schedule after completion of the interview. The unit describes the method, puts forward the advantages and disadvantages. It also provides the kind of topic for which interview will be most suited.

2.1 OBJECTIVES

After completion of this unit, you will be able to:

- define interview as a method of data collection;
- describe the method of interviewing and collecting research data;
- list out the ways in which the interview should be conducted – the do's and dont's; and
- enumerate the advantages and disadvantages of interviewing.

2.2 DEFINITION OF INTERVIEW

Interview can be broadly defined as a face to face verbal interchange in which there are two persons, that is the researcher or the interviewer and the other is the respondent or the interviewee. The interviewer tries to elicit the needed information on the research topic from the respondent. It appears to be like a conversation but this conversation is more with a specific purpose. In conversation the roles of the persons go on changing. One starts the conversation and the other responds then the other may take lead and the first one may be a listener so there may be alterations in roles. In interview on the other hand there is no changing of the roles of the interviewer and the interviewee. Conversation is unplanned whereas interview is clearly thought out and clearly planned.

2.3 DESCRIPTION OF INTERVIEW

Some interviews are conducted for gathering information from very important persons to know about their lives, ideas etc. This can be used for biographical writing. Other types of interview are the ones conducted for the purpose of understanding an event that has taken place, such as the suicide of an individual or murder of a person etc. Here the purpose is clear though the method of interviewing may vary considerably. Other type of interview is to have clear questions in order to understand a person and his or her problem. There is another type of interview between the doctor and the patient, where the doctor questions the patient in a particular order as to what the symptoms are and how long the person had it and then based on the interview which is called case history is able to come to an understanding of the diagnosis of the patient's problem.

An Interview, meant for a research study, involves the researcher or his investigators interacting on a one- to-one level with a respondent, who has been selected by the researcher as one of the subjects for the study. The interviewer puts questions to the respondent on a particular subject matter and the respondent's replies are noted down verbatim, where possible or recorded as an audio report.

The interview aims to describe the meanings of central themes in the life of the subjects. The main task in this is to understand the meaning of what the interviewees say. Interviews also can focus on the main aspects of the subject matter. The interview is as a follow-up instrument to get to know about certain responses to the questionnaires, so that one can further investigate their responses.

An interview can be one to one or it can be one to many. Answers to the questions posed during an interview can be recorded by writing them down (either during the interview itself or immediately after the interview) or by tape-recording the responses, or by a combination of both.

Interviews can be conducted with varying degrees of flexibility that is high and low degree of flexibility.

As regards high flexibility, one can take an example of studying sensitive issues such as teenage pregnancy and abortions. The investigator may use a list of topics rather than fixed questions. These may include how teenagers started sexual intercourse, the responsibility girls and their partners take to prevent pregnancy (if at all), and the actions they take in the event of unwanted pregnancies etc. The investigator should have an additional list of topics ready when the respondent falls silent, (example, when asked about abortion methods used, who made the decision and who paid).

The sequence of topics should be determined by the flow of discussion. It is often possible to come back to a topic discussed earlier in a later stage of the interview.

The unstructured or loosely structured method of asking questions can be used for interviewing individuals as well as groups of key informants.

A flexible method of interviewing is useful if a researcher has not much of an understanding of the problem or situation he is investigating, or if the topic is sensitive. It is frequently applied in exploratory studies. The instrument used may be called an interview guide or interview schedule.

In regard to low degree of flexibility, these interview methods are useful when the researcher is relatively knowledgeable about expected answers or when the number of respondents being interviewed is relatively large. In such cases structured questionnaires may be used so that large number of respondents could be covered. To cite an example, after a number of observations on the (hygienic) behaviour of women drawing water at a well and some key informant interviews on the use and maintenance of the wells, one may conduct a larger survey on water use and satisfaction with the quantity and quality of the water.

Interviews also can focus on the main aspects of the subject matter, or can get to know what the topic has to convey behind the scene and what the topic can convey.

Interviews are generally easier for respondent, especially if what is sought includes opinions or impressions. Interviews are time consuming and they are resource intensive. The interviewer is considered a part of the measurement instrument and interviewer has to be well trained in how to respond to any contingency.

Self Assessment Questions

1) Define interview. What are the characteristic features of research interview?

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2) Describe the process of interview.

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3) What are the aims of interviewing method?

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4) What is flexible and non flexible interview?

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2.4 TYPES OF INTERVIEWS

The interviews are of many types, as for instance (1) Informal, conversational type, (2) General interview guide (3) Standardised open ended interview (4) Closed fixed response.

Informal conversational type interviews

In the informal conversational interview, as is implied, the respondents are identified and are involved in a pleasant conversation. This conversation is with a specific research purpose that has been already determined. In the pleasant conversation, the interviewer talks in general, gets acquainted with respondents, after which the purpose of the research study is put across to the respondents and they are told what is expected of this study and how important the respondent and his responses are for the research. Thus from a general approach the researcher moves on to the specific purpose. There are no pre-determined questions, and the researcher indicates clearly that any answer the interviewee provides should be stated without hesitation as there is no right or wrong answers. During the interview the interviewer "goes with the flow" of what the respondent tells.

2.4.1 General Interview Guide

In this, every effort is put in to ensure that no important points are left out and the manner in which the questions should be asked and the sequences are kept up. This general interview guide also helps in conducting the interview to get information from all the respondents, on all the items that have to be covered. The interview guide thus provides the needed focus to the conversational approach and at the same time gives enough freedom to the interviewer and the respondent.

2.4.2 Standardised, Open Ended Interview

This type of interviews gives considerable scope for the respondent to answer fairly in detail his own ideas and opinions on the particular topic instead of answering or tick marking the answers only. These open ended questions are also uniformly put to all the respondents selected for the study. It not only elicits a variety of responses but also makes the research much more rich in contents.

2.4.3 Closed, Fixed-response Interview

In this the answers are provided to all the questions, and the respondents are required to select from within them, that response which is most applicable to them. Thus all respondents will choose answers from amongst the same set of alternatives.

This format is useful where the questions could have clear cut answers and they can be categorised meaningfully into 7 to 10 categories or less, and the respondents, except a few would find their answers within those categories and tick mark the same. Such responses are easy to score code and analyse, as compared to the

responses obtained in the open ended interview. This is so because, the responses in the open ended questions may be so many that the researcher will have to scrutinise all the responses and categorise them after the entire data have been collected.

2.4.4 Telephone Interview

Another type of interview is the Telephone Interview, in which the researcher gathers information rapidly through telephone. Though these interviews do help to establish a kind of rapport with the person at the other end of the telephone, yet many respondents may just refuse to answer and may put down the phone. At the same time, there is a personal touch which can be transmitted to the respondent. Furthermore the telephone interviews have to be necessarily short as no one would like to answer a large number of questions.

There are varying points of view regarding the advisability and utility of using the telephone to conduct research interviews.

The potential benefits associated with using telephone interviews as a mechanism of data collection include:

a) using economic and human resources efficiently,

b) minimizing disadvantages associated with in-person interviewing,

c) developing positive relationships between researchers and participants, and

d) improving quality of data collection.

The potential challenges to telephone interviewing include:

a) maintaining participant involvement,

b) maintaining clear communication,

c) communicating with participants who offer extraneous information,

d) encountering participants with health concerns, and

e) communicating with a third party.

Telephone interviewing can be an effective method of data collection when interviewers understand the potential benefits as well as challenges. We offer solutions to the identified challenges and make pragmatic recommendations to enhance researcher success based on the current literature and our research practice. Supportive training for interviewers, effective communication between interviewers and with research participants, and standardised telephone follow-up procedures are needed to ensure successful telephone data collection. We have found our 'Manual of Operations' to be an effective tool that assists research assistants to meet the requirements for successful telephone interviewing.

2.4.5 Validity of Interview

Studies by Kahn and Cannell (1961), Maccoby and Maccoby (1954) can be mentioned in this connection. There have been found inaccuracies in respondents versions during interviews when compared with the information obtainedby other means. In the case of self reports also similar inaccuracies have been found, particularly when the questions are asked about the sexual behaviour. Kanfer and Phillips (1970) who have discussed the methodological problems in using a few

persons self-report as an indicator of his actual experience concluded that, when a person describes his experiences or his internal states in an interview, care must be taken to recognise this behaviour as response that is under the control of both-person's history and the interview situation and not to accept it as a true record of past or internal events.

As mentioned by Patterson (1968), the interview is thus not such a measurement device which gives very accurate results. It is fallible and subject to substantial sources of error and bias. But we cannot discard the interview as a means of collecting information. It has great value and has its own advantages. Our effort should be to learn more about the sources of interview bias and influence. We must learn methods to eliminate them or accounting for them.(S.S. Mathur 1985). The interview's validity depends on how much the clinician is trained to obtain the information he wants from the client side.

Self Assessment Questions

1) What are the different types of interview? Elaborate each of them.

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2) What is telephone interview? What are its advantages and disadvantages?

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3) What is meant by validating interview? How would you do it?

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2.5 ASPECTS OF QUALITATIVE RESEARCH INTERVIEWS

Interviews are completed by the interviewer based on what the respondent says. Interviews are a far more personal form of research than questionnaires. In the personal interview, the interviewer works directly with the respondent. Unlike with mail surveys, the interviewer has the opportunity to probe or ask follow up questions.

Interviews are generally easier for respondent, especially if what is sought includes opinions or impressions. Interviews are time consuming and they are resource intensive. The interviewer is considered a part of the measurement instrument and interviewer has to be well trained in how to respond to any contingency.

2.6 INTERVIEW QUESTIONS

The questions to be included in any interview guide should be very carefully prepared. it must be able to tap the behaviours of the respondents, their moods and emotions and their exact responses which are truthful and objective. Given below are some of the important aspects that should be covered in any interview questions.

1) *Behaviours*: These questions try to find out from the respondent what he does or did or would do if given a situation. (Example, Respondent's opinion in regard to making admission to schools for children without screening under Right to Education Act. Here the person may say that he will write articles against it in the newspaper or give lectures or speeches condemning such non screening as it is harmful to children who are normal and intelligent. These indicate the behaviours of the respondent in regard to the topic).

2) *Opinions/values*: These questions will also tap the attitudes and opinions of the respondents regarding an issue. Opinions and values are generally strong until something very significant occurs which changes the opinion and value. The questions would be for instance, what does the respondent think of a person marrying out of caste and religion. The respondent may state that he is very much against anyone marrying out of caste and religion. This is his opinion and to an extent perhaps goes with his value system.

3) *Feelings*: The questions also elicit the feelings of the individual in regard to what a person feels rather than what a person thinks.

4) *Knowledge*: This would ensure that the topic of research and knowledge about the facts regarding the topic is conveyed to the respondent. Thus the respondents get facts about the topic.

5) *Sensory*: The Questions that would be included in this section will deal with the respondent's perceptions. That is, what ever he has seen, whatever he has touched, whatever he had heard, whatever he had tasted, whatever he had smelt etc.

6) *Background / Demographics*: The respondent is asked questions related to his age, gender, education, income, marital status etc., which are all put together constitute the socio demographic features of the respondent.

2.6.1 Sequence of Questions

It is important that the researcher should involve the respondents as early as possible in the interview situation. The researcher or the investigator should start with some factual information such as the date of birth, where they live etc. The controversial matters should be taken up either almost at the end or when the interviewer is very confident that he has been able to establish excellent rapport with the respondent.

The rule is that, start with facts and move on to other more subjective questions. Before asking questions related to any controversial matters, first ask about some facts. Distribute these fact based questions in the entire interview and ask questions about the present before questions about the past or future.

The last questions might be to allow respondents to provide other information they prefer to add and their impressions of the interview.

Self Assessment Questions

1) What type of questions should be included in interview?

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2) What purpose do these questions serve in the interview guide?

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3) What do you understand by qualitative research interviews?

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4) What are the sequence should we follow while writing interview questions?

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2.6.2 Stages of Interview

There are in all seven (7) stages in the interview investigation. These include the following:

1)	Thematising:	The *why* and *what* of the investigation.
2)	Designing:	Plan the design of the study.
3)	Interviewing:	Conduct the interview based on a guide.
4)	Transcribing:	Prepare the interview material for analysis.
5)	Analysing:	Decide on the purpose, the topic, the nature and methods of analysis that are appropriate.
6)	Verifying:	Ascertain the validity of the interview findings.
7)	Reporting:	Communicate findings of the study based on scientific criteria.

Let us describe each of these stages in detail.

1) **Thematising:** In this stage which is stage 1, the researcher tries to give an idea to the investigation as to what is being investigated, what for it is being investigate and what does the researcher hope to get out of the investigation. The researcher thus gives a theme to the entire topic that is being investigated. This sets the trend to what should be focused during the interview.

2) **Designing:** This is the second stage of interview in which the investigator or the researcher plans the entire design of the study. The kind of tools that should be used is planned, then sample to which the questions will be put are selected and the analysis of the research findings are also contemplated along with the typical hypothesis that would be tested.

3) **Interviewing:** In this third stage, the samples selected by the investigator are identified and are taken up for interview sessions. The researcher may use a interview guide which has the various questions to be put to the interviewee and the researcher follows the sequence to the extent possible, even though the researcher may change the order if it is found that the interviewee is not comfortable with certain type of questions. Thus the researcher may start from the general and move on the specific questions and thus complete the interview and later on take down what ever has been completed.

4) **Transcribing:** This is the fourth stage in the interview. Having conducted the interview, the research her has obtained the needed information for all the queries that had been put to the interviewee. Now these have to be adequately and systematically organised and this is what is meant by transcribing the answers in a certain sequence and order to make it more meaningful from the point of view of research.

5) **Analysing**: In this stage, the researcher takes the data and analyses the same in terms of the research questions and the hypotheses. Based on the results obtained from the analysis, the researcher either validates the hypothesis or rejects the same and come to clear conclusion regarding the research topic. The answers to the queries are found and the analysis clearly shows in which direction the trend of results move.

6) **Verifying:** In this stage the researcher validates the findings and comes to conclusion on different points of the research topic. For example, if the research was on which method of teaching contributes to enhancement of academic performance of children in class 8, and let us say that the researcher finds the tutorial method is better than lecture method in enhancing academic performance, these are put to statistical tests to find out if the differences obtained are statistically significant. Thus the researcher validates the research findings.

7) **Reporting:** The last stage is of reporting the findings in the form of a report. The report contains the topic, the methods of investigation, the tools used, the sample that was interviewed, the results obtained, the statistical analysis used and the final findings in terms of the objectives with which the research was taken up. Through the results, the researcher is able to indicate whether the objectives of the research were realised etc.

2.6.3 Procedure to be Followed During the Interview

During the interviews the researcher must take care of the following:

- Occasionally verify the tape recorder *(if used)* is working.
- Ask one question at a time.
- Attempt to remain as neutral as possible.
- Encourage responses.
- Be careful about the appearance when note taking.
- Provide transition between major topics.
- Don't lose control of the interview.

Every effort should be made to get all answers to all questions and that too truthfully and objectively. The researcher should if using a tape recorder, check if it works and whether it would be able to record the entire interview of one hour. The tapes should be otherwise changed so that uninterruptedly the interview can go on. Also before using the tape recorder the interviewer should get permission to use the same from the respondent. If there is a need and requested the researcher should be prepared to replay the recorder for the respondent who may like to verify what answers have been given and if they are to be reported etc.

The researcher should be always neutral and even if the respondent gives some kind of emotional statements, the researcher should not respond to it either positively or negatively but record the same as felt and presented by the respondent.

Where ever necessary the researcher must encourage the respondent to answer the questions. Many tactics may be used to get the respondent answer the questions, and it always works if the researcher has established a good rapport with the respondent.

Even if the interview is being tape recorded it is important to note the various emotions and expressions as well as facial expressions of the respondent at the appropriate places. These should be taken as note format and later on incorporated in the recorded interview at the appropriate places in the interview.

As the researcher moves from one topic to another, it must be made in a smooth manner.

The researcher must have complete control over the interview and should not slip at any point of time. Focusing on the interview and concentrating on how the respondent answers and the various expressions that the respondent is using are all to be recorded and used while analysing the data.

After the interview

The researcher should verify if the tape recorder, if used, worked throughout the interview. He should make detailed notes on the ones noted by him during the interview. He should write down observations made during the interview.

Self Assessment Questions

1) What do we mean by stages of interview? Write in detail each of the stages

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2) Elucidate the procedure to be followed while conducting interview.

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3) What are the precautions to be taken if the interview is being recorded?

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4) What precautions to be taken after the interview is completed?

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2.7 CONVERGENT INTERVIEWING AS ACTION RESEARCH

Some times an interview session is followed by a review session constituting a research cycle. The review sessions interpret the data emerging from the interviews and also help plan the questions in order to get a better understanding of the situation. The sampling and the process of gathering data are checked and modified if necessary. By asking more specific questions and pursuing deeper understanding the researcher interprets the data collected, gives explanations and where necessary put forward his disagreements. There is also a need to follow up the explanations and disagreements.

In interviewing one could structure interview or unstructured. In structured interview, the questions are in a certain sequence and put across to all the respondents in the same order and sequence and in the same manner so that the administration of the questions does not lead to any differences. The structured interview is also very useful for *quantitative analysis. Such structured interviews are generally used in survey research and not in one to one interviewing method unless it is a situation calling for such interview method.*

Interviewers read the questions exactly as they appear on the survey questionnaire. The choice of answers to the questions is often fixed (close-ended) in advance, though open-ended questions may also be included within a structured interview.

Structured *interviews* can also be used as a *qualitative research* methodology (Kvale, 1996). These types of interviews are best suited for *focus group* studies in

which it would be beneficial to compare/contrast participant responses in order to answer a research question.

For structured qualitative interviews, it is usually necessary for researchers to develop an interview schedule which lists the wording and sequencing of questions. Interview schedules are sometimes considered a means by which researchers can increase the reliability and credibility of research data. This can be done as follows:

- The respondents will have to be given explicit information detailing with the research process in its entirety.
- The research assistants should conduct an initial screening interview to ascertain whether the potential respondent is appropriate for the study
- It is also important to determine the literacy level of the participants and to use vernacular familiar to the respondents that is distinct from literary or research language.
- It is always important to take the informed consent of the participants. If necessary, the respondent's signature may also be taken in the form.
- The advantages and risks associated with the provision of the information have to be clearly delineated at the outset so that the participant can weigh the pros and cons of involvement.
- Research assistants or the data gatherers are crucial to any study. It is of strategic importance that research assistants are fully conversant with their responsibilities, the risks involved and the benefits of being part of a research team.

2.8 RESEARCH TEAM

Rather than filling these positions randomly from the pool of job seekers in a region that is characterised by high levels of unemployment, it is important to to employ a homogenous field team to alleviate some of the problems faced during research.

It is recommended that research assistants be recruited from groups that have similar research interests, such as for example, a class of research methodology students. The research activity should be linked to the curriculum.

Furthermore there is a need to give an adequate and effective orientation to the research assistants in regard to the research that is being conducted. It is imperative that the research assistants be aware of the exigencies of their respective positions prior to the onset of data collection.

Training of the Interviewers

It is important to train the investigators and the interviewers in the techniques of interviewing because the techniques to establish rapport with the respondents needs to be mastered by the interviewer as otherwise the interview may not be able to get the needed responses from the respondents. They must be trained in the process of interviewing so that they learn how to move from general to specific in regard to topics and areas, the way in which the questions are to be asked and the kind of body language, gestures to be shown and the clarifications etc., to be given to respondents, and many more nuances related to the interview needs to be understood by the interviewers and investigators. For this organising training for them becomes highly essential. The training is thus basically how the interviewer must control the

quality of the result that would be obtained from the interview. It is important to organise in detail and rehearse the interviewing.

Important aspects related to training

Interviewers need to know more than simply how to conduct the interview itself. They should have background of the study and why the study is important.

The interviewer may not understand why sampling is so important and if they have to conduct the interview efficiently and adequately they must know not only the background of the research but also why the sampling is important and who are the respondents from whom the information is being collected.

2.9 LET US SUM UP

We defined interview and interviewing as a face to face verbal interchange in which there are two persons, that is the researcher or the interviewer and the other is the respondent or the interviewee. The interviewer tries to elicit the needed information on the research topic from the respondent. It appears to be like a conversation but this conversation is more with a specific purpose.

Some interviews are conducted for gathering information from very important persons to know about their lives, ideas etc. There is another type of interview between the doctor and the patient, where the doctor questions the patient in a particular order as to what the symptoms are and how long the person had it and then based on the interview which is called case history is able to come to an understanding of the diagnosis of the patient's problem.

An Interview, meant for a research study, involves the researcher or his investigators interacting on a one- to-one level with a respondent, who has been selected by the researcher as one of the subjects for the study. The interviewer puts questions to the respondent on a particular subject matter and the respondent's replies are noted down verbatim, where possible or recorded as an audio report.

An interview can be one to one or it can be one to many. Answers to the questions posed during an interview can be recorded by writing them down (either during the interview itself or immediately after the interview) or by tape-recording the responses, or by a combination of both.

Interviews can be conducted with varying degrees of flexibility that is high and low degree of flexibility.

Interviews also can focus on the main aspects of the subject matter, or can get to know what the topic has to convey behind the scene and what the topic can convey.

The interviews are of many types, as for instance (1) Informal, conversational type, (2) General interview guide (3) Standardised open ended interview (4) Closed fixed response.

There have been found inaccuracies in respondents versions during interviews when compared with the information obtained by other means. Hence it is important to have the validation of the interviews.

Interviews are completed by the interviewer based on what the respondent says. Interviews are a far more personal form of research than questionnaires.

Topics included in the questions of the interview should cover behaviours, opinions and values of the respondent, their feelings, knowledge and their perceptions.

It is important that the researcher should involve the respondents as early as possible in the interview situation. The rule is that, start with facts and move on to other more subjective questions. Before asking questions related to any controversial matters, first ask about some facts. Distribute these fact based questions in the entire interview and ask questions about the present before questions about the past or future.

There are in all 7 stages in the interview investigation. These include the following:

1) Thematising: The *why* and *what* of the investigation.

2) Designing: Plan the design of the study.

3) Interviewing: Conduct the interview based on a guide.

4) Transcribing: Prepare the interview material for analysis.

5) Analysing: Decide on the purpose, the topic, the nature and methods of analysis that are appropriate.

6) Verifying: Ascertain the validity of the interview findings.

7) Reporting: Communicate findings of the study based on scientific criteria.

During the interviews the researcher must take care of the following:

- Occasionally verify the tape recorder *(if used)* is working.
- Ask one question at a time.
- Attempt to remain as neutral as possible.
- Encourage responses.
- Be careful about the appearance when note taking.
- Provide transition between major topics.
- Don't lose control of the interview.

The researcher should verify if the tape recorder, if used, worked throughout the interview. He should make detailed notes on the ones noted by him during the interview. He should write down observations made during the interview. In interviewing one could structure interview or unstructured. In structured interview, the questions are in a certain sequence and put across to all the respondents in the same order and sequence and in the same manner so that the administration of the questions do not lead to any differences. The structured interview is also very useful for *quantitative analysis. Such structured interviews are generally used in survey research and not in one to one interviewing method unless it is a situation calling for such interview method.* Then we discussed about the research team and the orientations that they should have.

2.10 UNIT END QUESTIONS

1) Define and describe interview as a research method

2) What are the various types of interview? Present these in detail

3) What are qualitative research interviews?

4) Discuss the manner in which questions have to be written for an interview.

5) Describe convergent interviewing as action research.

6) What is a research team? How do we select a research team?

7) What kind of training is needed for the research team?

2.11 SUGGESTED READINGS

Kerlinger, Fred, N. 1979, *Founded of Behavioral Research*, New York, : H 107, Rinehart and Winstem Inc.

Kumar. R (2006) *Research Methodology*. New Delhi: Dorling Kingsley

UNIT 3 QUESTIONNAIRE METHOD

Structure

3.0 Introduction

3.1 Objectives

3.2 Definition and Description of Questionnaires

3.3 Types of Questionnaires

- 3.3.1 Structured Questionnaires
- 3.3.2 Unstructured Questionnaires
- 3.3.3 Semi-structured Questionnaires

3.4 Purpose of Questionnaires Studies

3.5 Designing Research Questionnaires

3.6 The Methods to Make a Questionnaire Efficient

3.7 The Types of Questionnaire to be Included in the Questionnaire

3.8 Questionnaires: Why they don't Work

3.9 Do's and Don'ts in Designing Questionnaires

3.10 Formulating Questions for Measuring Attitudes

3.11 Measuring Attitudes: Recording Responses

3.12 Questions for Measuring Knowledge

3.13 Advantages and Disadvantages of Questionnaire

3.14 Pilot Test of Questionnaire

3.15 Monitor the Responses

3.16 Analyse the Survey Data

3.17 When to Use a Questionnaire?

3.18 Some Common Mistakes in Using Questionnaires

3.19 Let Us Sum Up

3.20 Unit End Questions

3.21 Suggested Readings

3.0 INTRODUCTION

According to dictionary, Questionnaire is a written or printed form used in gathering information on some subject or subjects, consisting of a set of questions to be submitted to one or more persons.

A questionnaire consists of a large number of questions arranged under different headings and covers the research topic which is being studied by the researcher. These questions are then sent or read out to the respondent (sample chosen for the study) and the questionnaire is filled in by the researcher or by the respondents

themselves. These responses are then subjected to analysis and the results obtained are tabulated.

A questionnaire thus is a *research* instrument consisting of a series of *questions* and other prompts for the purpose of gathering information from respondents. The questionnaire was invented by **Sir Francis Galton**.

Questionnaires can also be defined as a list of research or survey questions asked to respondents and designed to extract specific information. It serves 4 basic purposes, viz.,(i) collect the appropriate data (ii) make data comparable and amenable to analysis. (iii) minimize bias in formulating and asking questions (iv) to make questions engaging and varied.

In this unit we will be dealing with questionnaires, their definition and description, the type of questionnaire, designing of questionnaire, the formulating of questions, the various do's and dont's of adding certain questions etc. The unit will also cover the format of questionnaire, the structure etc. The unit gives you an idea of when and how to use questionnaires.

3.1 OBJECTIVES

After completing this unit, you will be able to:

- define questionnaire;
- describe the characteristic features of questionnaire;
- explain how to Design the questionnaire;
- list out the do's and don't's of questions to be added to the questionnaire;
- list the types of questionnaires; and
- analyse the uses and functions of the questionnaire.

3.2 DEFINITION AND DESCRIPTION OF QUESTIONNAIRES

In survey research where large number of respondents have to be contacted and a large amount of data has to be gathered, questionnaire as a tool of data collection appears to be the most suitbale and appropriate. The questionnaires play a central role in the data gathering process. In order to gather efficient and correct information and that too economically, the questionnaire has to be worked out very systematically and designed most appropriately depending on the information needed.

Questionnaires play a central role in the data collection process. Questionnaires facilitate the coding and capturing of data accurately, and it leads to an overall reduction in the cost and time associated with data collection and processing.

Questionnaires contain a large number of questions pertaining to the subject matter. In many questionnaires there are sections that are part of the major topic and these sections go into details of information on the subject matter. The questionnaires address the following issues, viz., why the research is being conducted and why the survey form has been selected for collecting information. Secondly the questionnaire deals with how the information is going to be used and whether the information will be accurate and timely. The questionnaires can be sent by post to the respondents or given peronally by the researcher, and getthe same filled in by self or by the

respondent. When sent by post the number of questionnaires returned will be far less and if it is 66% it may be considered representative.

3.3 TYPES OF QUESTIONNAIRES

Questionnaires are of varied types and depending on the type of survey undertaken the questionnaire will be of a certain type. Let us see what are the various types of questionnaires we have. The first one is structured questionnaire, unstructured questionnaire, and semi structured questionnaires. Let us see in detail each of these types.

3.3.1 Structured Questionnaires

As the name suggests, these are structured. That is the answers are already given and the respondent has to tick mark the most suitable answer. In most questionnaire the responses to most questions are exhaustive and still if a person wants to give a response aside from the responses mentioned in the questionnaire, there is a column indicating "any other response, specify". However all responses are clearly gven and predetermined and there is very little flexibility to add anything except in rare cases.

3.3.2 Unstructured Questionnaires

In this, the questions are open ended and the answers are not given or predetermined. And hence the respondent can give whatever response he would like to these questions. However even though unstructured, the sequence of the questions follow an order. This sequence is predetermined by the researcher. The answers obtained are noted down by the researcher or the respondent himself fills it up. Since there is flexibility to add one's own thoughts and feelings, these questionnaires elicit very factual and truthful and descriptive responses.

3.3.3 Semi-structured Questionnaires

These types of questionnaires have a mixed approach. In this some questions are structured and some are not structured. There is generally a mixed approach.

Structured questionnaires allow for the exploration of patterns and trends which help to describe what is happening in the L&T context and provide a measure of respondents' opinions, attitudes, feelings, and perceptions about issues of particular concern to the evaluator. They also help to identify patterns and trends that merit further exploration using qualitative methods.

Self Assessment Questions

1) Explain questionnaire method.

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2) What are the three types of questionnaire?

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3.4 PURPOSES OF QUESTIONNAIRE STUDIES

1) **Descriptive Studies**

The task here is to count something. The intent may be to estimate the parameters (population facts) for certain characteristics of a given population or to survey current practices in some field or profession.

2) **Analytical Studies**

In these studies, the investigator is usually interested in comparing characteristics among two or more populations. Studies in which the interest lies in exploring the relationship among variables for a single population also qualify as analytical studies.

3.5 DESIGNING RESEARCH QUESTIONNAIRES

In any survey the researcher or the organisation concerned which has proposed the research survey may try to get highly complex information. Though by and large their efforts will be to get objective answers to the questions, they would like to also get some feelings, opinions and a few subjective statements on the issues and problems addressed in the questionnaire. At the same time it must be remembered that the researcher must be cautious not to project own preconceptions as questions so that replies are likely to come from like minded individuals, or from people who guess the meaning, or from those who interpret the questions in their own way and answer accordingly. It must be kept in mind that replies to open questions are quite messy and ambiguous and it is not possible to find out what people really meant.

3.6 THE METHODS TO MAKE A QUESTIONNAIRE EFFICIENT

Questionnaire designers have to look into these factors, namely, the layout, presentation, the overall appearance and avoid the temptation to ask four questions in one question etc. To cite an example, if we are conducting a survey on drop outs of children before reaching class 8, we may have a question as given below:

"Do you think the parents or children responsible for drop outs or whether the income is low and the children supplement the family income. Here too many questions and each can be answered separately with different answers.

Here are certain important rules for questionnaire construction which have to be kept in mind while we construct the questionnaire.

- Give attention to the structure of the questionnaire.
- Start with a straightforward question to get the recipient to start replying.
- Move from the general to the specific in each section (usually).
- Try to ensure some variety in the types of question asked (see below).
- Draw skidpaths if there are alternative routes (of the type 'if 'Yes' go on to question x') to make sure that every eventuality is covered. Then choose whether to leave these in to help people move through the questionnaire.
- Group related topics into modules.
- Make the structure clear to the respondent by using headings.

- Choose the question types to fit the purpose. The main options are:
- closed questions – pre-assigned response categories or 'yes' and 'no' boxes (make sure that each category is distinct [especially for age ranges] and that all eventualities are covered – if your response category is not provided what does this say about the competence of the designers?)
- Open questions – at simplest this may be a 'Why is this?' after a closed question; the intention is that the respondents should reply in their own words (don't forget to analyse these and that categorisation/synthesis takes time)
- Use response scales where appropriate. These are a form of closed question. Most common are:

Some of the important scales that could be made use of include the following:

1) Likert scales: a set of choices to record agreement/disagreement.
2) Guttman scales: statements arranged according to the strength of attitude.
3) Thurstone scales: forced choice to agree/disagree.
4) Semantic differential: seeking quantitative measures by offering scales between extremes.

While using any of the scales above, it must be remembered that the researcher must offer clear and consistent instructions for completing the questionnaire (easily forgotten if questions are considered individually)

The researcher must pay attention to question wording since this is a topic in its own right. Thus the overall aim of the research questionnaire is to obtain research relevant information efficiently. For this the researcher requires active co-operation from the target group. Every effort should be made to get back the maximum questionnaires that were distributed to respondents, or else the findings may not be possible to generalise. This ofcourse would take time, planning and attention to detail. However considering the difficulty in getting the questionnaires back, it has been stated that two-thirds of the questionnaire if returned back tht could make the research findings worth the while.

Self Assessment Questions

1) What is purpose of questionnaire in research?

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2) Give important rules for constructs the good questionnaire.

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3) Define Likert scale and Thurstone scale.

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3.7 THE TYPE OF QUESTIONS TO BE INCLUDED IN THE QUESTIONNAIRE

A high response rate to a questionnaire is most likely to be achieved, if people find themselves wondering what other people are saying in reply to the questions because they want to know what other people are doing (especially if they know that the results will be made public), or if they find the questions or tasks set of interest in themselves.

How can we make questionnaires more interesting? This can be done if we keep the following in our view:

- Instead of staying within the confines of the traditional question and answer mode, put across a few challenging questions? To cite an example, what are the reasons for parents not allowing their youngsters to go for night parties?
- If you have a choice to get an item that is most important and that too when ever you need it for your writing, what would it be?
- Another way is to use examples or vignettes and asking questions based on the same.
- Or you can ask people to change the chosen scenario to make it a closer fit to their own working behaviour by adding words, crossing out bits or changing numbers.
- To give an example, faced with someone who spends two hours every day reading and responding to e-mails, someone else might change the description to make the pattern less regular or to reduce the time. It was not too difficult to devise a set of rules for interpreting the changes made to reflect emerging differences.
- Another method is to present people with photographs, drawings or plans of a real or imagined information service area and asking for comments of the respondents. This would provide an excellent response from the participants.

3.8 QUESTIONNAIRES: WHY THEY DON'T WORK?

Despite all our best efforts, sometimes the questionnaires are not effective and they do not work.

The reasons for the same include the following:

1) Highly complicated.
2) Require more than one answer.
3) Not relevant to the culture.
4) Use of jargons.

5) They are highly biased and touches upon sensitive area.

6) Embarrasses the respondent.

7) Confuses the Respondent.

Designing a questionnaire is a complicated process. There are mainly three main types of questionnaires: 1) Mail or self administered questionnaire; 2) Face to face interviews; 3) Telephone Interviews.

Always send a covering letter to the questionnaire, If you're sending a cover letter, be sure to use letterhead stationary and have the principal investigator or someone of renown from the funding agency sign it to add prestige.

Your cover and advance letters should include the following:

a) a brief explanation of the study

b) an explanation of how you obtained the respondent's name

c) why it is important that each "sampled" respondent cooperate, and

d) a short assurance of confidentiality.

Your mailing envelope should include the words "Address Correction Requested."

Don't forget to include a stamped self-addressed envelope for the respondent to return the completed form.

It is a good idea to include your name and address on the questionnaire itself, in case the respondent loses the enclosed return envelope.

A few things to remember when planning a mail survey:

- Avoid mailing during holiday periods.
- Do not have forms arrive on the first of the month.
- If mailing to businesses, do not have forms arrive on the first day of the business week.
- If you plan only two questionnaire mailings, you might want a reminder postcard between mailings or a telephone follow-up. Do not send a postcard if you have planned three questionnaire mailings.
- Be sure to allow at least two weeks between mailings.
- Change your cover letter for both the second and third mailings.
- If possible, change the questionnaire for follow-up mailings and include a new question.
- When writing questionnaires that respondents will see, it is very important that you present a professional-looking document so that the respondents will know this is a serious research effort.
- Never send Xerox copies of loose pages held together with a staple in the upper corner.
- Always have the forms printed in a booklet, either saddle-stapled or glued, and use a heavier paper for the cover.

- Do not forget to plan for printing time when setting your study schedule.
- Remember when laying out your questionnaire that it will be printed on both sides of a page and formed like a booklet, so that the final number of pages will be a multiple of 4. This format also allows for double-width layouts, if necessary.
- Word questions to be read by a respondent as if you or an interviewer were speaking to the respondent. Don't word them like school exams; remember to insert the work "please" in all instructions (e.g., "PLEASE SPECIFY").

Other precautions to take include the following:

- Do not skip around from topic to topic.
- Just as in writing a paper, prepare an outline and group your questions according to topic or subject matter.
- Write transitional statements between sections or changes in subject matter.
- In general, you will begin your questionnaire with a question related to the subject of the research, one that is designed to capture the respondent's interest without being threatening.
- This can be an open-ended question that encourages respondents to express their thoughts about the subject matter and literally trains them to talk to you.
- However, it is often better to begin with closed questions that respondents can answer easily so that they can learn that the interview process will be fairly easy for them.
- Questions can then be ordered from the least threatening issues to the most threatening. "Threatening" is, of course, a relative term, because questions about sexual practices and respondent incomes are considered "threatening."
- In general, demographic questions are asked in the last part of the interview. However, it is sometimes necessary to obtain some demographic information early in the interview in order to determine how to proceed through sections of the questionnaire.
- It is not an absolute fixed rule that demographics are asked toward the end of the interview; you just need to be aware that they are considered sensitive and intrusive by some respondents. At the same time, of course, they are critical for analysis.
- One important rule to follow is never to ask for more personal/demographic information than is required for analysis. For example, if 'race' is never going to be an analysis variable, do not ask the question.
- The same thing is true for marital status, income, gender, etc. It is not necessary to include all of the demographic questions that one has developed. In fact, it would be a rare survey that should require all of them.

3.9 DO'S AND DON'TS IN DESIGNING QUESTIONNAIRES

1) Be sure all answer choices are mutually exclusive.

2) Check for ambiguity in wording the question – can respondents interpret the meaning of words differently?

3) Don't write your questions so that you "lead" the respondent to an obvious response.

Example 1 (Leads the Respondent): Are you in favor of forcing state, to hold all rape case investigations strictly confidential ans the court proceedings not to be revealed in public?

Example 2 (Leads the Respondent): Do you think completely stopping the over the counter drug distribution you can have lesser drug abusers and addicts?

It is important to give due attention to pronouns and articles in the questionnaire.

- Watch personal pronouns (gender references) – never use only he (his) or she (her) unless you are referring to a specific gender.
- Do not shorten questions that refer to previous questions; repeat the reference.
- Do not let questions about knowledge provide the answer you are seeking (e.g., Are you aware that xyz program exists?). Obviously, the question indicates that it does exist.
- Don't ask respondents to perform arithmetic computations; instead ask for factual information and make the calculations during the analysis.
- Write specific rather than general questions and word them so that they communicate uniform meaning.
- Avoid using double negatives – these are especially possible when using Agree/ Disagree.

Example of Double Negative: Indicate if you agree or disagree.

A chemical used in food production that has a negligible cancer risk should be prohibited even though it delays spoilage, prevents rancidity, or prolongs storage time.

"Don't know" is generally not offered as an answer choice; however, there may be times when "no opinion" should be offered.

Offering a middle choice makes less difference to those who feel strongly about an issue, but if you offer a middle choice, more people will select it. One solution to the middle choice is to ask two questions, that is, the first to identify the respondent's position on an issue and the second to measure intensity.

Example 1 (Identify Respondent's Position): Are you satisfied or dissatisfied with the prices of meals in your student union?

Satisfied (Skip to 2)
Dissatisfied (Skip to 3)
Makes no difference

Example 2 (Additional Question to Measure Intensity): Are you _____

Very satisfied
Somewhat satisfied
Slightly satisfied

Example 3 (Additional Question to Measure Intensity): Are you _____

Very dissatisfied

Somewhat dissatisfied

Slightly dissatisfied

Before the "official" pretest, try out your questionnaire on a few members of the target population.

If there are many changes as a result of the "official" pretest, be sure to conduct a second pretest before beginning main study data collection.

Asking threatening questions about behaviour

- Open questions are better than closed questions for obtaining information on frequencies of socially undesirable behaviour.
- Example 1: On the average, about how many times do you watch thematinee show skipping the classes?
- Long questions are better than short questions for obtaining information on frequencies of socially undesirable behaviour.
- The use of familiar words may increase the reporting of frequencies of socially undesirable behaviour.
- Example 1: "Pot" for marijuana
- To obtain reports of threatening behaviour, use data obtained from informants, if possible.
- Consider deliberate loading of the question to reduce both overstatements of socially desirable behaviour and understatements of socially undesirable behaviour.
- Do not depend on wording such as "Did you happen to …" to improve reporting of socially undesirable behaviour. Such wording may actually increase threat.
- Example 1 (Loaded): Do you think it should be possible for a pregnant woman to obtain a legal abortion if she is married and does not want any more children?
- Example 2 (Unloaded): Do you believe that a woman should ever be allowed to have an abortion?
- For socially undesirable behaviour, it is better, before asking about current behaviour, to ask whether the respondent has ever engaged in the behaviour. For socially desirable behaviour, it is better to ask about current rather than usual behaviour.
- Embed the threatening topic into a list of more and less threatening topics, to reduce the perceived importance of the topic to the respondent.
- Consider alternatives to standard questions, such as randomised response, card sorting, and sealed envelopes.
- Consider the use of diaries or asking the panel members questions several times to improve both reliability and validity.
- Avoid the use of reliability checks on the same questionnaire, since this will annoy respondents.
- Ask questions at the end of the interview to determine how threatening the topics were perceived to be by the respondent.

3.10 FORMULATING QUESTIONS FOR MEASURING ATTITUDES

1) Make sure that the attitude objects are clearly specified.

2) Decide on the critical aspects of the attitude to be measured—affective, cognitive, and action.

3) Do not assume that these must necessarily be consistent.

4) Measure the strength of the attitude by building a strength dimension into the question itself; by asking a separate question or questions about strength; or by asking a series of independent questions, each of which reflects the general attitude.

5) Avoid double-barreled and one-and-a-half barreled questions that introduce multiple concepts and do not have a single answer. Where possible, separate issues from individuals or sources connected with the issues.

Example 1 (Bad): Do you favor legislation or marijuana for use in private homes but not in public places?

Example 2 (Better): Do you favor or oppose legislation of marijuana for use in private homes?

Consider the use of separate unipolar items if there is a possibility that a bipolar item might miss independent dimensions.

Example 1 (Bipolar): In the past few days were you…excited or bored , joyful or depressed

Example 2 (Unipolar): In the past few days were you…..Yes No Bored?, 1. Depressed? 2.

Recognise that the presence or absence of an explicitly stated alternative can have dramatic effects on response. Specification of alternatives will standardise the question for respondents.

Example 1 (Bad): In the past two years has your income increased or decreased?

Example 2 (Better): In the past two years has your income increased, decreased, or remained the same?

Pretest new attitude questions to determine how they are being interpreted by respondents.

If general and specific attitude questions are related, ask the general question first.

When asking questions of differing degrees of popularity involving the same underlying value, ask the least popular item first.

In attempting to measure changes in attitude over time, ask exactly the same questions in all time periods, if at all possible.

3.11 MEASURING ATTITUDES: RECORDING RESPONSES

1) Use open questions sparingly, for example, to develop further questions, to explore a topic in depth, and to obtain quotable material.

2) Closed-ended questions are more difficult to construct but easier to analyse and less subject to interviewer and coder variance.

Avoid interviewer field coding, if at all possible. If necessary, it is better to have field coding done by the respondent.

Example 1 (Bad): Interviewer says, "In general, how good is your health?"

Excellent Good Fair Poor

Note: Interviewer codes what the respondent says and inevitably makes the decision. For example, "It's not wonderful, but its' O.K." This response could be coded by interviewer as "Good" or "Fair."

Example 2 (Better): Would you say your health, in general, is

Excellent Good Fair Poor

Start with the end of a scale that is least socially desirable. Otherwise, the respondent may choose a socially desirable answer without hearing or reading the entire set of responses.

Do not use rating scales with more than four or five verbal points. For more detailed scales, use numerical scales.

Example 1 (Bad): 1) Extremely likely 2. Very likely 3 Somewhat likely 4. Slightly likely. 5. Slightlyt unliely 6. Somewhat unlikely 7. Very unlikely 8. Extremely unlikely

Example 2 (Better): Extremely Likely Extremely Unlikely

1 2 3 4 5 6 7

Consider the use of analogies such as thermometers, ladders, telephone dials, and clocks for numerical scales with many points.

Ranking of preferences for alternatives can be done only when respondents can see or remember all alternatives.

In telephone interviews ranking should be limited to two or three alternatives at a time.

In self-administered and face-to-face interviews where cards are used, respondents can rank no more than four or five alternatives.

If many alternatives are present, respondents can rank the three most desirable and the three least desirable.

Rankings can be obtained by a series of paired-comparison questions.

Respondent fatigue, however, limits the number of alternatives that can be ranked.

Example 1 (Paired comparison): Would you prefer to go shopping on a weekday or on the weekend?

When lists are used, complete information can be obtained only if each item is responded to with

a "yes/no," "applies/does not apply," "true for me/not true for me," and the like, rather than with the instruction "Circle as many as apply."

Complex ratings, even in two dimensions, can be accomplished by means of card-sorting procedures.

Self Assessment Questions

1) Make list of a good questionnaire.

.....

.....

.....

.....

2) According to you which types of questions are not included in a good questionnaire.

.....

.....

.....

.....

3.12 QUESTIONS FOR MEASURING KNOWLEDGE

1) Before asking attitude questions about issues or persons, ask knowledge questions to screen out respondents who lack sufficient information.

2) Consider whether the level of difficulty of the questions is appropriate for the purposes of the study. For new issues simple questions may be necessary.

3) Where possible, reduce the threat of knowledge questions by asking them as opinions or using phrases such as "do you happen to know" or "can you recall, offhand."

4) When identifying persons or organisations, avoid overestimates of knowledge by asking for additional information or including fictitious names on the list.

Example 1 (Bad): To what extent do you think a to e below, can be trusted to act honestly while in office?

a) Manmohan Singh

b) L.K.Advani

c) Atal Behari Bajpai

d) P.Chidambaram

e) Pranab Mukherjee

If "yes/no" questions are appropriate, ask several on the same topic to reduce the likelihood of successful guessing.

For knowledge questions requiring numerical answers, use open-ended questions to avoid either giving away the answer or misleading the respondent.

Example 1 (Open ended): How many hours a day is the store open?

Consider the use of pictures and other nonverbal procedures for determining knowledge.

When attempting to determine level of knowledge, do not use mail or other procedures that allow the respondents to look things up or to consult with others.

Procedure to be followed step by step in making an instrument for data collection:

1) Define the purpose
2) Develop the questions
3) Develop a guide
4) Arrange a schedule
5) Set up the groups
6) Conduct the sessions
7) Record the data
8) Analyse the data
9) Present the findings [not discussed below]
10) Develop the questions. Plan for 5–10 questions.

Effective group questions are carefully defined.

a) They Are always open ended (none of these are to be yes-or-no questions).
b) They are qualitative rather than quantitative in orientation (they ask about perceptions and feelings, rather than about facts or numbers);
c) Never ask "why" directly;
d) Have many imbedded probes; and
e) Allow for process concerns as well as content.
f) Develop a guide

Successful groups for data collection comprise people who share some common characteristic (such as being your client), have diverse experiences, and represent diverse perspectives.

Problems to be avoided

Interviewers often get into trouble because they violate basic rules. The following problems should be avoided:

Type	Example	What to Do or Avoid
Double-barreled questions	Have you ever experienced burnout, and what do you do to prevent it?	Avoid double-barreled questions. Ask one question at a time. Do not combine questions and expect an answer.

Two-in-one questions	What are the advantages and disadvantages of working at this university?	Do not combine opposite positions in one question. Separate out the parts, and things will be much clearer.
Restrictive questions	Do you think that female administrators are as good as male administrators?	The phraseology of this question eliminates the possibility that females might be better. Avoid questions that inherently eliminate some options.
Leading questions	ABC Inc. wants departments to be close to their clients. What do you think of my department's client relations?	Do not precede questions with a position statement. In this type of question, the interviewer states a view or summarizes the position of a current or recent event and then asks for a response. This tends to lead the respondent in a given direction.
Loaded questions	Would you favour or oppose murder by agreeing with a woman's free choice concerning abortion?	Avoid questions that use loaded words and are emotionally charged.

Steps in Questionnaire Construction

1st Step: Survey objectives and data requirements

In order to address the survey's objectives, you should prepare a document that provides a clear and comprehensive statement of the survey's goals, data requirements, and the analysis plan. This document will determine the variables to be measured, and ultimately, the survey questions and response alternatives.

When formulating the questions, consult with subject-matter experts and if possible, members of the target audience.

Make certain that the questions are relevant to the survey objectives and information requirements and ensure that there is an established rationale behind each question.

Also, you should explain how the information gathered from these questions will be used and whether they will be good measures of the required data.

2nd Step: Analysis plan

The next step in designing a questionnaire is to create an analysis plan. The analysis plan will consist of the following:

a) Outline the questionnaire's objectives and data requirements.

b) Describe the target audience as clearly as possible.

c) Identify the reference period (the time period under construction—in the last year, in the last month etc.).

d) Develop a list of the units to be sampled (e.g., students, houses, teachers, etc.).

e) Decide on the method of data collection to be used (e.g., face-to-face interview, telephone interview, mailed questionnaire, etc.).

f) Explain how the questionnaire content, wording, format and pre-testing process will be developed; as well as the procedures put in place to deal with the interviewer training and non-response results.

g) Choose the methods to be used during the data processing (e.g., coding, editing etc.). Some of the other issues that can be analysed during this step include estimation methods, result output tabulations, result reports and the analysis. Finally, the last two important issues to be considered are the time required to complete the entire process and the budget that has been allotted to it.

3rd Step:Survey target population

Often the target population (the population for which information is required) and the survey population (the population actually covered) differ for practical reasons. It is necessary to impose geographical limitations excluding certain parts of the target population because they are inaccessible due to difficulty or cost.

It is also possible that some of the survey concepts and methods that are used can be considered inappropriate for certain parts of the population, as it may be difficult to find them . For example, if we want to find out the govt. jobs taken up by those who completed their vocational course in secretarial practice, it would be difficult as they can be all over India. We have therefore to restrict it to geographical limits of northern India only or South India only etc.

4th Step: Method of data collection

This next step in questionnaire design involves developing the methods of data collection. This is important step because you need to consider the costs, physical resources, and time required to conduct the survey.

First, select the best method for gathering the required data. Keep in mind that cost and data quality will be directly impacted by the method you choose.

There are several options available: face-to-face interviews or computer assisted personal interviewing (CAPI) are two examples. These methods are administered by a trained interviewer and can have either a structured or unstructured line of questioning.

There are also two telephone methods available: telephone interviews or computer assisted telephone interviewing (CATI). Both of these methods are also administered by a trained interviewer, but the telephone versions are structured with a more formal interview schedule. Finally, there is also the option of a collecting data through a self-completed questionnaire.

This method allows the respondent to complete the questionnaire without the aid of an interviewer. It is highly structured and can be returned by mail or through a drop-off system.

5th Step: Size of the survey

Since each survey is different, there are no hard and fast rules for determining its size. The deciding factors in the scale of the survey operations are time, cost, operational constraints and the desired precision of the results. These have to be evaluated.

6th Step: Data processing plans

This processes the questionnaire responses into output. Coding; data capture; editing; dealing with invalid or missing data; and, if necessary creating derived variables are the tasks that will be completed during data processing. In short, the aim in this step is to produce a file of data that is as free of errors as possible.

7th Step: Budget

Sometimes, questionnaire design is decided upon by the amount of money available to do a specific survey. Costs are one of the main justifications for choosing to conduct sample surveys instead of a census. With surveys, it is possible to obtain reasonable results with a relatively small sample or target population. For example, if you need information on all Canadian citizens over 15 years of age, a survey of a small percentage of these (1,000 or 2,000 depending on the requirements) might provide adequate results.

8th Step. Time

One of the advantages of survey sampling is that it permits investigators to produce the information quickly. It is often the case that survey results are required shortly after the need for information has been identified. For example, if an organisation wants to conduct a survey to measure the public awareness of a media advertisement campaign, the survey should be conducted shortly after the campaign is undertaken. Since sampling requires a smaller scale of operation, it reduces the data collection and processing time, while allowing for greater design time and more complex processing programs.

9th Step. Questionnaire testing

a) This is a fundamental step in developing a questionnaire. Testing helps discover poor wording or ordering of questions.

b) Identify errors in the questionnaire layout and instructions

c) Determine problems caused by the respondent's inability or unwillingness to answer the questions.

d) Suggest additional response categories that can be pre-coded on the questionnaire.

e) Provide a preliminary indication of the length of the interview and any refusal problems.

f) Testing can include the entire questionnaire or only a particular portion of it.

g) A questionnaire will at some point in time have to be fully tested.

10thStep. Data quality

This step identifies errors and verifies results. No matter how much planning and testing goes into a survey, something unexpected will often happen. As a result, no survey is ever perfect.

Quality assurance programs such as interview training, information editing, computer program testing, non-respondent follow-ups, and data collection and output spot-checks are required to minimize non-sampling errors introduced during various stages of the survey.

Statistical quality control programs ensure that the specified error levels are controlled to minimum.

In addition to the above, there are many other issues related to developing a questionnaire and these are given below:

- Is the introduction informative? Does it stimulate respondent interest?
- Are the words simple, direct and familiar to all respondents?
- Do the questions read well? Did the overall questionnaire flow?
- Are the questions clear and as specific as possible?
- Does the questionnaire begin with easy and interesting questions?
- Does the question specify a time reference?
- Are any of the questions double-barreled?
- Are any questions leading or loaded?
- Should the questions be open- or close-ended? If the questions are close-ended are the response categories mutually exclusive and exhaustive?
- Are the questions applicable to all respondents?

The introduction of the questionnaire is very important because it outlines the pertinent information about the survey being conducted. The introduction should:

- provide the title or subject of the survey;
- identify the sponsor;
- explain the purpose of the survey;
- request the respondent's co-operation; and
- inform the respondent about confidentiality issues, the status of the survey (voluntary or mandatory) and any existing data-sharing agreements with other organisations.

Respondents frequently question the value of the gathered information to themselves and to others. Therefore, be sure to explain why it is important to complete the questionnaire, how the information will be used, and how respondents can access the results. Ensuring that respondents understand the value of their information is vital in undertaking a survey.

The opening questions of any survey questionnaire should establish the respondents' confidence in their ability to answer the remaining questions. If necessary, the opening questions should help determine the respondent as a member of the survey population

3.13 ADVANTAGES AND DISADVANTAGES OF QUESTIONNAIRE

Advantages of Questionnaire

1) They are cheap

2) Do not require as much effort from the questioner as verbal or telephone surveys.

3) They have standardised answers that make it simple to compile data.

4) They sharply limited by the fact that respondents must be able to read the questions and respond to them.

5) Questionnaires can be used to collect data quickly.

6) All participants can be given the opportunity to provide feedback.

7) Structured questionnaire data can be processed by software packages like SPSS

Disadvantages of Questionnaire

1) Questionnaires also have many of the same problems relating to question construction and wording that exist in other types of *opinion polls*.

2) Questions could be interpreted differently by respondents. It can be difficult to design questionnaires to minimize this effect.

3) Data processing and analysis for large samples can be time consuming.

4) It can be difficult motivating potential respondents to complete questionnaires.

Procedure for a questionnaire survey

The following procedures are recommended for a questionnaire survey:

a) Determine the major questions

b) Draft questionnaire items

c) Design the questionnaire

d) Pilot test the questionnaire

e) Develop a data-collection strategy

f) Develop a cover letter and send the questionnaire

g) Monitor the response

h) Analyse the survey data

i) Determine the major questions

You should begin by understanding the major questions or issues you wish to address. These will generally be reflected in the questionnaire sections, as described below.

Typical sections

1) *Introduction or background information*

This section includes questions about your client that may be important to your analysis. It should solicit background information you need to address, such as the respondent's department, region, experience, gender, position, and experience with the supplier. Ask only what is essential to your sub analyses. If you don't need to know, don't ask.

2) *Quality of goods or services received by your client*

This section is the heart of the questionnaire and requires you to develop dimensions of quality that may be important. The client (respondent) then rates the quality of your outputs along these dimensions.

3) *Other considerations*

For this section, choose a title that matches other important dimensions of client service, such as "Timeliness of Delivery," "Safety," or "Environmental Responsibility."

4) *Responsiveness, problem-solving, and client service*

This set of questions will address your client's perceptions of your service. This section might be merged with the quality or other-considerations section. These major sections of your questionnaire provide the overall outline. Once you know these major themes, you need to develop actual questions or items.

5) *Types of questionnaire items*

You must draft actual questionnaire items within each of the sections of your questionnaire. It is difficult to vary the types of questions too often, so economise within each section by asking similar types of questions.You will need to master six types of questionnaire item before you invent your own. Unproved alternatives are often confusing to the reader. So use unproved alternatives only after you are fully familiar with the types of items described below.

6) *Multiple-choice item*

This type of question is useful for the introduction or background-information section.

7) *Fill-in-the-blank item*

Use this form when the possibilities are too numerous to list using a multiple-choice item. They work well in a mix with multiple-choice. So, they are also good in the introduction.

8) *Rating-scale item*

This type of item enables you to collect a lot of information efficiently. Rating-scale items are good for rating your goods and services, other considerations, and so forth.

How important is it for you to learn about:

	NOT AT ALL				VERY
a) Environmental responsibility	1	2	3	4	5

9) *List item*

This type of item provides a stronger form of feedback than a rating scale. It forces the client to identify what he or she considers important and helps the researcher to avoid the problem of people just agreeing because it is easy to check a box without feeling that it is important to them.

What aspects of your training course did you like most? Please list three of them.

.....

.....

.....

10) *Comment-on item*

This type of question is another way to gain an understanding of what your client considers important. It is particularly useful for "mopping up" in the concluding section.

Please write any other comments about the work of school principal and suggestions for training that you consider important:

.....

.....

.....

11) *Likert-scale items*

The Likert scale allows the respondent to agree or disagree with a series of statements. (Note, these are statements, not questions.) The Likert scale is easy to use, if you know how, and like other rating scales it is an efficient way to collect lots of information.

	STRONGLY DISAGREE	DISAGREE	NEITHER DISAGREE NOR AGREE	AGREE	STRONGLY AGREE
I am satisfied with my professional development (that is, I am acquiring new skills and knowledge)	☐	☐	☐	☐	☐
There are possibilities for career advancement (that is, for increased responsibilities)	☐	☐	☐	☐	☐

Now, you try a few. Write your own statements for dimensions of your work unit's outputs. Include items that are worded both positively and negatively.

12) *Design the questionnaire*

As you write the items, you should begin considering an overall design for your questionnaire. Follow these rules:

- Lay out items to avoid confusion;
- Use the formats shown in the examples;
- Don't allow a question to cross over two pages;
- Instruct the respondent in what you want him or her to do for each type of question; and
- Number the questions consecutively.

Use a booklet to make it professional and facilitate completion. Have a title and introductory explanation, to let your clients know what you are doing and to help them fill out the questionnaire properly.

Arrange the questionnaire in sections, each with a title to help structure the respondent's thinking; and to facilitate analysis.

Group similar types of items together especially with rating-scale items; but Fill-in-the-blank and multiple-choice items can be mixed together.

Use all available space. Try to limit the length of the questionnaire to four pages and Use space for comments to fill in pages.

3.14 PILOT TEST OF QUESTIONNAIRE

Even the best questionnaire needs testing. You might understand everything in the questionnaire, but your client may not. Here are some tips to help you test your questionnaire. Show the questionnaire to critical colleagues and ask them to read it and to comment in the margins; and then revise the questionnaire.

Following this, test the questionnaire with a few clients

Now you have a questionnaire ready to go! You'll need to work out a strategy for how and where to send it. The first part of your strategy is to select a sample of people who fairly represent all your clients. Prepare a list of your sample clients.

The second part of your strategy is to decide on the technology you will use to send out your questionnaire.

1) *Standard:* Questionnaires can be printed, in your office or by a printer, and mailed to respondents. Respondents fill them out and mail them back. Results are manually input into a database or statistical program for analysis.

2) *Optical scanning:* It is possible to print questionnaires so that they can be read by an optical scanner that picks up the responses automatically.

3) *Electronic questionnaires:* The coming wave for internal client-needs assessments is the e-mail questionnaire. This is designed on a computer and sent as a computer file to clients via e-mail. The client receives the file, completes the questionnaire on his or her computer, and sends the file back to you by e-mail.

4) *Follow-up:* You also need a follow-up strategy. This may include tracking the number returned each day – e-mail lets you know who hasn't yet replied. Sending a reminder two weeks after first mailing; and deciding on corrective action, if returns are poor. When key people in each unit distribute and collect the questionnaire, pyramid networks are great, but personal networks are the best of all for getting returns. Develop a cover letter and send the questionnaire.

5) *Cover letter:* Every successful questionnaire comes with a cover letter. The letter should contain six pieces of information:

   i) The purpose of the questionnaire;

   ii) Who is sending it;

   iii) Why the respondent was selected;

   iv) Where, how, and when to return the questionnaire;

   v) Whom to contact if there are further questions; and

   vi) Whether and how the results will be shared.

3.15 MONITOR THE RESPONSES

Count on 4 to 6 weeks to get responses to your questionnaire. Send reminder letters or put your network into action; and start your analysis when responses dry up.

3.16 ANALYSE THE SURVEY DATA

Questionnaire analysis generally means dealing with large numbers or with a variety of numbers. This usually requires you to use statistical concepts and computers.

Many simple statistics programs are available to help you analyse data.

Six steps for constructing effective questionnaires: A Summary

1) *Determine your questions*

   What do you intend to find out?

   How will the information be helpful?

   Which issues will relate to the questionnaire?

2) *Specify your sub questions*

   List all the things you want to find out;

   Indicate those sub questions to be included in the questionnaire; and

   Refine your list.

3) *Draft the items*

   Translate questions into items; and

   Formulate multiple-choice, fill-in-the-blank, rating-scale, list, comment-on, and Likert-scale questions.

4) *Sequence the items*

   Group the items into topic sections;

   Group the items by question type; and

   Rewrite the items as necessary.

5) *Design the questionnaire*

   Order and number questions;

   Layout a booklet format; and

   Arrange the questions on pages.

6) *Pilot test the questionnaire*

   Clarify the wording of the questionnaire with respondents;

   Group test the draft questionnaire;

   Discuss the questionnaire with the group; and

   Revise the questionnaire and retest it if necessary.

Survey questionnaire, e-survey, telephone interview, face-to-face interview, focus group. Surveys collect data from a targeted group of people about their opinions, behaviour or knowledge. Common types of surveys are written questionnaires, face-to-face or telephone interviews, focus groups and electronic (e-mail or Web site) surveys.

Practicalities and how to make a questionnaire efficient

- It is advisable to test questionnaires before using them, to ensure that participants understand them and interpret them in the way that you expect, that they do not take too long to complete, and that they yield useful data.

- It can be difficult to achieve an appropriate balance between asking sufficient questions to get useful feedback, but not so many questions that respondents get bored or feel they don't have sufficient time to devote to completing them.
- Complex questionnaire formats and structures can be difficult for respondents to complete.
- Longer questionnaires can be answered more quickly if the format of the question is fairly similar and respondent do not need to keep learning how to complete different types of questions, or have to make too many decisions about which sections apply to them.
- Different approaches to phrasing questions may have strengths and weaknesses for collecting the data needed (see section on Question design).
- Questions will need to be in accordance with the relevant legislation and University guidance for the ethical handling of data. This involves not collecting unnecessary personal data, and if the questionnaire is intended to be anonymous, any personal data that will enable respondents to be identified.
- Distributing and allowing students to complete paper-based questionnaires in class time is likely to maximise representative completion.

3.17 WHEN TO USE A QUESTIONNAIRE?

In spite of its wide usage, the questionnaire is not appropriate for all purposes.

Even when you are developing your own questions, there are at least two other methods of data collection which you should consider.

Perhaps the most obvious alternative is using a questionnaire is the personal interview. The advantages of this approach include richness of response, ability to clear up misconceptions, opportunity to follow up responses, and, by implication, better data in many situations. Additionally, respondents will usually be more conscientious if the interviewer is present.

Finally, the use of a questionnaire does reduce the influence (and consequent bias) due to the presence of the interviewer.

3.18 SOME COMMON MISTAKES IN USING QUESTIONNAIRES

Before we advance to the "do's" of questionnaire development, let me warn you of some of the most common "don'ts" in such studies. We'll touch on many of these items later in the recommendations sections, but in the hope that they will stick, I'll enumerate them at the outset. Eight of the most common mistakes are:

1) Asking for information which is more readily and/or accurately available elsewhere
2) Failing to create sufficient incentive for the respondent to answer.
3) Including questions which the respondent sees as ridiculous or unimportant.
4) Including questions which encourage some sort of "favorable" response.
5) Using equivocal or ambiguous questions.
6) Using responses which are too limited in scope to be useful.

7) Not living up to promises made to respondents.

8) Developing a form which is too long or complicated.

Have patience. A questionnaire is not an end in itself, only the means to an end. If fits into an overall plan for the survey and needs to be considered in light of other decisions about the survey design.

A survey is a planned collection of data for some purpose. As such, it must begin with a clear statement of purpose(s). Only if this is done prior to developing the questionnaire can the instrument be evaluated for quality as a data source.

3.19 LET US SUM UP

In this unit we have studied about the relevance of questionnaire in research work and it consists of a large number of questions arranged under different headings and covers the research topic which is being studied by the researcher. These questions are then sent or read out to the respondent (sample chosen for the study) and the questionnaire is filled in by the researcher or by the respondents themselves. These responses are then subjected to analysis and the results obtained are tabulated. The three types of questionnaire are included structured questionnaire, unstructured questionnaire, and semi structured questionnaires. Descriptive and analytical purposes are two purposes. Here you have also studied designing, methods to make a questionnaire efficient and what types of questions to be included in the questionnaire. Advantages and disadvantages are also discuss in detail.

3.20 UNIT END QUESTIONS

1) Explain importance of questionnaire in research.

2) What are the major steps for a construction of good questionnaire?

3) What are the advantages of questionnaire?

4) What are the disadvantages of questionnaire?

3.21 SUGGESTED READINGS

Kerlinger, Fred, N. 1979, *Founded of Behavioral Research*, New York, : H 107, Rinehart and Winstem Inc.

Kumar. R (2006) *Research Methodology*. New Delhi: Dorling Kingsley

UNIT 4 CASE STUDY

Structure

4.0 Introduction

4.1 Objectives

4.2 Definition and Description of Case Study Method

4.3 Historical Account of Case Study Method

4.4 Designing Case Study

- 4.4.1 Determine and Define the Research Questions
- 4.4.2 Select the Cases and Determine Data Gathering and Analysis Techniques
- 4.4.3 Prepare to Collect Data
- 4.4.4 Collect Data in the Field
- 4.4.5 Evaluate and Analyse the Data
- 4.4.6 Prepare the Report

4.5 Requirements for Case Studies

4.6 Guideline to Follow in Case Study Method

4.7 Other Important Measures in Case Study Method

- 4.7.1 Preliminary Considerations: Problem Representation
- 4.7.2 Evidence Collected and Interpretation

4.8 Case Reports

4.9 Let Us Sum Up

4.10 Unit End Questions

4.11 Suggested Readings

4.0 INTRODUCTION

Case Study method in research is a unique method in which one case is taken and researched on various issues. It could be for a limited period of time or a longitudinal study. In other words for example a researcher may be interested to study twins over 16 years in regard to their psychological growth and development. Thus Case study refers to the collection and presentation of detailed information about a particular participant or small group, frequently including the accounts of subjects themselves. This is a form of qualitative descriptive research. In this unit we will be studying about the case study method in psychological research, its characteristic features, the procedure adopted in case study method, its advantages and disadvantages.

4.1 OBJECTIVES

After completing this unit, you will be able to:

- define case study method;
- describe its various features and characteristics;
- explain the procedure of data collection through case study method; and
- analyse the advantages and disadvantages of this method.

4.2 DEFINITION AND DESCRIPTION OF CASE STUDY METHOD

Case study method is an in depth study of a particular situation or a subject at different time periods etc. It can also refer to study of a small group of persons or events in regard to analysing the same in depth. It is a method used to narrow down a very broad field of research into one easily researchable topic. The case study looks intensely at an individual or small participant pool, and draws conclusions only about that participant or group and only in that specific context.

The case study research design is useful for testing whether scientific theories and models actually work in the real world. For psychologists, anthropologists and social scientists, case study method has been regarded as valid research method.

Case studies are complex because they generally involve multiple sources of data. For instance they include multiple cases within a study, and produce large amounts of data for analysis. Case study research excels at bringing us to an understanding of a complex issue or object and can extend experience or add strength to what is already known through previous research. Case studies emphasise detailed contextual analysis of a limited number of events or conditions and their relationships. Researcher Robert K. Yin defines the case study research method as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, and when the boundaries between phenomenon and context are not clearly evident and in which multiple sources of evidence are used (Yin, 1984, p. 23).

Uses of Case Study method

Researchers from many disciplines use the case study method for varied purposes:

1) To build upon theory.
2) To produce new theory.
3) To dispute or challenge theory
4) To explain a situation.
5) To provide a basis to apply solutions to situations
6) To explore, or to describe an object or phenomenon.
7) The advantages of the case study method are its applicability to real-life, contemporary, human situations and its public accessibility through written reports.
8) Case study results relate directly to the common readers everyday experience and facilitate an understanding of complex real-life situations.

4.3 HISTORICAL ACCOUNT OF CASE STUDY METHOD

Case studies are not a new form of research; naturalistic inquiry was the primary research tool until the development of the scientific method. Case study research has drawn from a number of areas such as the clinical methods of doctors; the social casework technique of social workers, the methods of historians and anthropologists, and the techniques of newspaper reporters and novelists.

The case study method has evolved over a period of time mainly due to research interest of many sociologists, anthropologists, social workers and psychologists. Each of these professionals treid to study the humans in their natural setting and understand their behaviours in different situations. This helped to provide the needed information on human behaviour as related to self, others, family, society and culture.

Case studies are basically qualitative even though in the present day much statistical analysis is being done to the data made available through case study method. The qualitative aspect is one of the criticisms against case study. Also case study is criticized on the grounds that it fails to provide evidence of inter subjective agreement. Furthermore, case study uses only a few samples and thus the data obtained and the findings arrived at cannot be generalised to the whole population.

Self Assessment Questions

1) Describe the case study method.

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2) What are the characteristic features of case study?

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4.4 DESIGNING CASE STUDY

4.4.1 Determine and Define the Research Questions

The first step in case study research is to establish a firm research focus to which the researcher can refer over the course of study of a complex phenomenon or object. The researcher establishes the focus of the study by forming questions about the situation or problem to be studied and determining a purpose for the study. The research object in a case study is often a program, an entity, a person, or a group of people. Each object is likely to be intricately connected to political, social, historical, and personal issues, providing wide ranging possibilities for questions and adding complexity to the case study. The researcher investigates the object of the case study in depth using a variety of data gathering methods to produce evidence that leads to understanding of the case and answers the research questions.

Case study research generally answers one or more questions which begin with "how" or "why." The questions are targeted to a limited number of events or conditions and their inter-relationships. To assist in targeting and formulating the questions, researchers conduct a literature review. This review establishes what research has been previously conducted and leads to refined, insightful questions about the problem. Careful definition of the questions at the start pinpoints where to look for evidence and helps determine the methods of analysis to be used in the study. The literature review, definition of the purpose of the case study, and early determination of the

potential audience for the final report guide how the study will be designed, conducted, and publicly reported.

4.4.2 Select the Cases and Determine Data Gathering and Analysis Techniques

During the design phase of case study research, the researcher determines what approaches to use in selecting single or multiple real-life cases to examine in depth and which instruments and data gathering approaches to use. When using multiple cases, each case is treated as a single case. Each cases conclusion can then be used as information contributing to the whole study, but each case remains a single case. Exemplary case studies carefully select cases and carefully examine the choices available from among many research tools available in order to increase the validity of the study. Careful discrimination at the point of selection also helps erect boundaries around the case.

The researcher must determine whether to study cases which are unique in some way or cases which are considered typical and may also select cases to represent a variety of geographic regions, a variety of size parameters, or other parameters. A useful step in the selection process is to repeatedly refer back to the purpose of the study in order to focus attention on where to look for cases and evidence that will satisfy the purpose of the study and answer the research questions posed. Selecting multiple or single cases is a key element, but a case study can include more than one unit of embedded analysis. For example, a case study may involve study of a single industry and a firm participating in that industry. This type of case study involves two levels of analysis and increases the complexity and amount of data to be gathered and analysed.

A key strength of the case study method involves using multiple sources and techniques in the data gathering process. The researcher determines in advance what evidence to gather and what analysis techniques to use with the data to answer the research questions. Data gathered is normally largely qualitative, but it may also be quantitative. Tools to collect data can include surveys, interviews, documentation review, observation, and even the collection of physical artifacts.

The researcher must use the designated data gathering tools systematically and properly in collecting the evidence. Throughout the design phase, researchers must ensure that the study is well constructed to ensure construct validity, internal validity, external validity, and reliability. Construct validity requires the researcher to use the correct measures for the concepts being studied. Internal validity (especially important with explanatory or causal studies) demonstrates that certain conditions lead to other conditions and requires the use of multiple pieces of evidence from multiple sources to uncover convergent lines of inquiry. The researcher strives to establish a chain of evidence forward and backward. External validity reflects whether or not findings are generalisable beyond the immediate case or cases; the more variations in places, people, and procedures a case study can withstand and still yield the same findings, the more external validity. Techniques such as cross-case examination and within-case examination along with literature review helps ensure external validity. Reliability refers to the stability, accuracy, and precision of measurement. Exemplary case study design ensures that the procedures used are well documented and can be repeated with the same results over and over again.

4.4.3 Prepare to Collect the Data

The case study method is such that on a single case large amount of data may be collected and the possibility of the researcher losing sight of the original research theme / topic is very likely. Hence as soon as data is obtained the researcher must systematically organise the same. Advance preparation assists in handling large amounts of data in a documented and systematic fashion. Researchers prepare databases to assist with categorising, sorting, storing, and retrieving data for analysis.

It is important to train the investigators in how to do case study. Clear protocols should be established and procedures for collecting the data should be spelt out much before the investigation starts. It is always ideal to have a pilot study taken up before the final study is launched. During the training of investigators, it is important to cover the basic concepts of the study, the various terminologies that have been used, the tools that are used for data collection, the processes as to how to follow up, how to conduct the interviews and observations, and the various techniques that have to be applied in the study. Such a thorough training would go a long way in making the study valid and reliable. The training program should cover protocols for case study research, including time deadlines, formats for narrative reporting and field notes, guidelines for collection of documents, and guidelines for field procedures to be used.

In case study method the investigators have to be good listeners. They should be trained to establish quick rapport with the subject concerned, and must ask good questions and interpret answers. Good investigators review documents looking for facts, but also understand the intricacies of the situation so that they could give good interpretation. Investigators need to be flexible in real-life situations and not feel threatened by unexpected changes. They should not get perturbed if a subject does not keep the appointment but carry on, contact the subject and continue with the work. Investigators must also be aware that they are going into the world of real human beings who may be threatened or unsure of what the case study will bring.

Once the training is over, it would be ideal to conduct a pilot study to find out any possible problems that may arise. They should put to test the various techniques and tools in order to see if these work or need any modifications. Researchers need to anticipate key problems and events, identify key people, prepare letters of introduction, establish rules for confidentiality, and actively seek opportunities to revisit and revise the research design in order to address and add to the original set of research questions.

4.4.4 Collect Data in the Field

As the data are being collected, they have to be stored systematically. The researcher will get multiple source of evidences which have to be so arranged that the same can throw light on the research problem that is being investigated.

Case study research is flexible, but when changes are made, they are documented systematically.

The researcher must use field notes and databases to categorise and reference data so that it is readily available for subsequent reinterpretation. The researcher using case study method would record testimonies, stories, and illustrations which can be used in later reports. They should be aware that as they get exposed to vast amount of information they may get biased by giving special attention to the subject concerned etc. They assist in determining whether or not the inquiry needs to be reformulated

or redefined based on what is being observed. Field notes should be kept separate from the data being collected and stored for analysis.

4.4.5 Evaluate and Analyse the Data

In this step, the researcher having collected the required information examines the raw data using many interpretations in order to find linkages between the research object and the outcomes with reference to the original research questions. Throughout the evaluation and analysis process, the researcher remains open to new opportunities and insights. The case study method, with its use of multiple data collection methods and analysis techniques, provides researchers opportunities to triangulate data in order to strengthen the research findings and conclusions.

Case study method facilitates sorting the data in many different ways and thus help create new insights into the research problem. Researchers categorise, tabulate, and recombine data to address the initial propositions. They may conduct cross-checks of facts and discrepancies and add to the richness of the findings. The field notes and the various observations made and recorded in notes come handy to interpret the data in a more appropriate manner and analyse the problem in depth.

They place their data in the following manner:

1) They place information into arrays
2) Create matrices of categories
3) They work out flow charts and graphs to project their data more realistically
4) They tabulate the frequencies of the data and the events that had taken place.
5) Even though qualitative data are the main source of evidence, the researcher also tries to quantify the data.
6) Another technique, the cross-case search for patterns, keeps investigators from reaching premature conclusions by requiring that investigators look at the data in many different ways.
7) Cross-case analysis divides the data by type across all cases investigated. One researcher then examines the data of that type thoroughly.
8) When a pattern from one data type is corroborated by the evidence from another, the finding is stronger. When evidence conflicts, deeper probing of the differences is necessary to identify the cause or source of conflict.
9) In all cases, the researcher treats the evidence fairly to produce analytic conclusions answering the original "how" and "why" research questions.

4.4.6 Prepare the Report

The next step is to prepare the report of the data analysed. The researcher makes graphs, flow charts, bar diagrams and pie diagrams to present their data over a period of time. They present conflicting evidences clearly and point out the reasons for such conflicting evidence and provide inferences drawn from the same.

The manner in which the researcher presents the report makes it easy for head and wanting to know more about the issue concerned. The manner in which the data are presented not only kindles the curiosity of the reader but the latter gains confidence in the researcher and his methodology that has been used to provide the information.

In case studies as mentioned earlier, there could be two or more cases being observed and studied in detail. In the report the researcher may like to present all cases as one case and later on present one chapter for each case and highlight the similarities, differences and characteristic features of the findings in each case. Before finalising the report, the researcher presents the same to certain professionals and other researchers for review and based on their comments the report is then finalized.

4.5 REQUIREMENTS FOR CASE STUDIES

1) The case study should be conducted in such a way that the results can be communicated to readers.

2) The reader must be able to determine from the evidence presented the nature of the argument, and why and how conclusions were drawn.

3) The reader must be able to determine the evidential nature of the case as published

4) The evidence must follow convincingly and should allow the reader to determine the basis upon which generalisation has been made.

5) Case studies provide a framework to help researcher decide if the presented evidence is convincing and if the necessary material has been provided to allow the reader to extend, connect or otherwise apply the case report to his/her own circumstances.

4.6 GUIDELINES TO FOLLOW IN CASE STUDY METHOD

Make a thorough review of literature before embarking on case study method for research purposes.

Contrast and compare different methodological perspectives.

The assumptions on which the case study is based should be made clear.

Data gathering should be undertaken only after a thorough training in the method.

All the techniques and methods to be used to be put to pilot test first before launching on the final collection opf data.

Evidences collected should be properly and systematically arranged and recorded.

Both audio and visual instruments could be used for the purpose.

The degree to which evidence is presented is very important as the interpretation can be reliable and valid only if sufficient evidence is presented.

All evidences obtained during data collection must be integrated with field notes and other observations made by the investigator.

Unless the methodology used is appropriate and presented in detail and the loopholes and shortcoming in the methodology are avoided the data and evidences collected cannot be reported.

All researchers, regardless of their beliefs about case study completion, must reveal the steps they followed so that others can determine the merits of the completed work.

In order for the reader to be convinced that case studies have merit, the researcher must show the relationship between argument and evidence.

4.7 OTHER IMPORTANT MEASURES IN CASE STUDY METHOD

These measures could be organised into *three major* categories as given below:

1) Preliminary considerations: Problem representation

2) Evidence gathering and interpretation, and

3) Case reports.

4.7.1 Preliminary Considerations: Problem Representation

The first step to be taken by the researcher before suing case study method is to define the problem clearly. What made the researcher take up this topic? What has gone on in the topic and what more needs to be done and what the researcher is planning etc.

There should be a clear statement of the conceptualisation of the problem and how this concept was translated into research problem.

The questions related to the problem must be clearly stated. The match between the conceptualisation and its translation, the problem representation, must be congruent.

The researcher must highlight the importance of questions and research goals and how they correspond with each other.

The fundamental feature of problem representation is a clearly delineated match between the research question/problem and the researcher's original intent in posing that question/problem.

It must be remembered that the longer the time frame over which the case study is conducted, the more difficult it will be to ensure problem representation.

In posing a question or questions that are investigated longitudinally, the intent-question(s)/problem(s) match may need to be modified to take into account potential changes in participants or the specific dynamics of the proposed study (context, location, participant descriptors, et cetera).

Thus the problem representation is instrumental to the clear formation of a logically stated and conceptually clear research formulation.

The purpose of the research and how the research was conducted have to be made very clear before the report is written.

4.7.2 Evidence Collection and Interpretation

The next logical step is that the researcher should indicate how the data or information was collected. To determine if the case study based evidence is reliable etc., the reader needs to determine if the evidence has been collected in a systematic and thoughtful manner to ensure that it is both accurate and meaningful.

The following questions need to be answered for the above:

1) How was the evidence collected?

2) What source of evidence was employed?

3) What rules of evidence was applied?

4) How will the evidence be verified and confirmed?

5) How has the researcher interpreted the evidence?

6) How were the conclusions reached?

7) How did the researcher make the judgments?

In the first instance, a clear statement of how evidence was collected, processed and incorporated in the theoretical perspective must be made obvious by the researcher. If, for example, head-notes are treated as evidence that will be incorporated into the evidential basis of the reported case, this posture must be revealed.

Convincability and generalisability are the next important issues, in which the researcher should make clear the problem(s)/context(s) to be investigated. Evidence should be provided that the collected information has been verified. Next, the researcher(s) should provide evidence that the case has been conducted in a manner that is consistent with the principles of trustworthiness.

Due to the considerable variation in possible approaches to case studies and more generally qualitative research, the researcher has to state how evidence is interpreted. Further, the reader should be informed as to what degree the evidence presented is representative of informants' viewpoints as opposed to being more representative of the researcher's own notes and experience.

In the final analysis, it is important that the reader who reads the researcher's report should be convinced about the evidences and must be able to generalise to other situations which are similar.

Self Assessment Questions

1) What are the steps involved to design a case study in research?

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2) Explain three major measures in case study method.

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4.8 CASE REPORTS

Case reports can be written in any of the two forms given below, viz., (i) Graphical or visual approach (ii) Ratios.

The *graphical or visual* approach is very useful as it clearly depicts the trend of the evidences and in which direction the results move etc. regarding the phenomenon concerned.

In regard to *ratios*, the ratio is the number of times a point is raised within a theme divided by the total number of points raised within each theme. To illustrate with a very general example, if the theme of a response to a question was "male-female relationship issues" and there were a total of 12 respondents, 12/12 would mean that all respondents had made salient remarks about this theme. The quotes that best illustrate the reported theme would be selected from these 12 responses.

In nutshell, if the goal is to generalise, it is necessary for the author(s) to reveal to the reader the evidential base around which conclusions are based. There are a number of ways of accomplishing this step -primarily, however, it must be obvious to the readers how conclusions were drawn.

The advantage of the case study research design is that you can focus on specific and interesting cases. This may be an attempt to test a theory with a typical case or it can be a specific topic that is of interest. Research should be thorough and note taking should be meticulous and systematic.

The first foundation of the case study is the subject and relevance. In a case study, you are deliberately trying to isolate a small study group, one individual case or one particular population.

In the design of a case study, it is important to plan and design how you are going to address the study and make sure that all collected data is relevant. Unlike a scientific report, there is no strict set of rules so the most important part is making sure that the study is focused and concise.

As for analysing results for a case study tends to be more opinion based than statistical methods. The usual idea is to try and collate the data into a manageable form and construct a narrative around it.

Use examples in your narrative whilst keeping things concise and interesting. It is useful to show some numerical data but remember that you are only trying to judge trends and not analyse every last piece of data. It is always a good idea to assume that a person reading your research may not possess a lot of knowledge of the subject so try to write accordingly.

4.9 LET US SUM UP

In this unit we studied the case study research method. We defined this method as one that takes up one individual or one case or one group of persons and studies them in great depth to understand a certain phenomenon. We gave examples of such research. We then historically traced the case study research and found that it had considerable use for anthropologists and related disciplines and we also saw that this method was used by social workers based on case work methodology. We then learnt how a case study method is designed and what are all the steps that are involved in designing case study research. Following this we took up the procedure in conducting case study research and the training one must have for the investigators to conduct a case study research. We then put forward the guidelines for conducting case study based research and how to report the same so that it is meaningful, factual and objective. We also learnt about the requirements for conducting a case study research and the various other measures involved in case study method. We briefly

touched upon case reports and indicated what format it should be and what it should contain and how it is to be written.

4.10 UNIT END QUESTIONS

1) How are the subjects selected for case study method?

2) In what way the gathering and analysis of case study method data is unique?

3) Describe each of the steps in designing case study method research

4) Put forward the guidelines to be followed in case study method.

5) What are the requirements for case study method research?

6) Describe with examples the evidence collection and interpretation of data gathered in case study method research.

7) What are case reports? How are they written?

4.11 SUGGESTED READINGS

Abramson, P.R. (1992). *A Case for Case Studies: An Immigrant's Journal*. Newbury Park: Sage.

Bassey, M. (1999). *Case Study Research in Educational Settings*. Buckingham: Open University.

Campbell, D.T. & Stanley, J.C. (1966) *Experimental and Quasi-experimental Designs for Research*. Chicago: Rand McNally.

Kazdin, A. E. (1982). *Single-case Research Designs: Methods for Clinical and Applied Settings*. New York: Oxford Press.

UNIT 1 REPORT WRITING

Structure

1.0 Introduction

1.1 Objectives

1.2 Purpose of a Report

1.3 Writing Style of the Report

1.4 Report Writing – the Do's and the Don'ts

1.5 Format for Report in Psychology Area

1.6 Major Sections in a Report

- 1.6.1 Title
- 1.6.2 Authors Name
- 1.6.3 Institutional Affiliation
- 1.6.4 Running Head

1.7 Abstract

- 1.7.1 Accuracy
- 1.7.2 Self Contained
- 1.7.3 Concise and Specific
- 1.7.4 Ways to Conserve Character
- 1.7.5 Non-evaluative Type of Abstract
- 1.7.6 Coherent and Readable

1.8 Introduction to Research Report

- 1.8.1 Develop the Background
- 1.8.2 State the Purpose and Rationale
- 1.8.3 Method of Writing the Introduction

1.9 General Guidelines to Write Introduction

1.10 Let Us Sum Up

1.11 Unit End Questions

1.12 Glossary

1.13 Suggested Readings

1.0 INTRODUCTION

This unit introduces you to report writing. Reports are of many types , with some based on research work and some based on review of work done, and a few others based on one's experience. There are reports which we write about some matter to another agency or to our successor indicating what had gone on until now and what more to be done etc. Thus report writing is of many types. In this unit we are going to focus on writing of a report based on research work. This unit will provide you with the purpose of a report, writing style of a report, how to write the abstract to a report as well as the typical major headings one must follow in a research report.

1.1 OBJECTIVES

After reading this unit, you will be able to:

- discuss the purpose of a report;
- explain the writing style of the report;

- describe the do's and don't's of writing a report;
- discuss the format for report writing in psychiology area;
- explain major sections in a report;
- discuss the characteristics of an abstract; and
- describe the guidelines for writing an introduction to a report.

1.2 PURPOSE OF A REPORT

A report is a written document which contains information regarding a topic which has been dealt with by a person. For example a teacher might have dealt with a topic on how teaching methodology influences students performance. The person would have tried out three or four different teaching methods such as lecture method, discussion method, tutorial method and audiovisual method. Students performance would have been noted before teaching by a certain method and after the teaching with a particular method was over say in a period of 3 months, the performance of students will be assessed once again. Based on the results the person would have written the report about what all was done, and what was the final outcome of such a research. The report which is a written document contains a number of chapters each focusing on certain aspects and with final chapter highlighting the conclusions arrived at based on the research.

Thus the purpose of report in the field of psychology is to communicate to others what has been experimented or researched on, and what has been the result of such an effort. Through the report we tell other psychologists and colleagues in the field as well as the practitioners what experiment we did on memory or what therapeutic method did we try to use to find its effectiveness in the treatment of mental disorder etc. along with what our results showed in regard to the experiment conducted or the research work. In addition to reporting findings, we provide information to other psychologists and researchers in this area to enable them to make a critical evaluation of procedures and a reasonable judgment about the quality of the research that has been conducted whether experiment or survey or case study. In addition, another purpose of the report in psychology is that we want to provide enough information so as to enable others to replicate and extend the findings.

1.3 WRITING STYLE OF THE REPORT

Research reports are written in a scientific writing style. You have probably noticed that the writing style in published articles are fact-filled, highly structured, and more concise than other kinds of writing. This is deliberate. The goal of an experimental report is to provide objective information and not to entertain the reader or express opinions, or talk about personal life experiences. Even so, the writing should be interesting, simple and lively.

Whenever a report is written we also refer to many other sources from where we obtained varied types of information. It is important that all facts need to be documented by citing the published sources from where the information has been obtained. You must also avoid your subjective ideas and opinions in regard to the topic while writing a research report.

Every effort should be made to keep off one's personal feelings from the writing of the report. One can use a formal style or an informal style, either way no personal feelings must be allowed to enter the report. A report is a scientific document for

public consumption and perhaps for the scientific community and it is not an essay or personal statement. Most authors avoid personal pronouns like I or we, whenever possible (their occasional use is acceptable in order to avoid awkward sentences).

The scientific style is also parsimonious. The author attempts to give complete information in as few words as possible, because the amount of publication space in journals is limited and authors write as concisely as possible, selecting their words carefully. Each word is chosen for its precision.

Most of us need practice to write scientifically because it is very different from the common styles of writing. Always avoid flowery expressions in writing and practice precision and accuracy in stating facts. These in turn would contribute to making you write the report in a scientific manner. In a scientific report, it is always advisable to avoid slang as it lacks exact meaning and might not be universally familiar.

1.4 REPORT WRITING – THE DO's AND THE DON'Ts

When you write your research report, be careful to use unbiased language. The American Psychological Association (APA), the American Psychological Society (APS), and other publishers of psychological research reports, such as the Sage Publications are committed to encouraging language free of gender and ethnic bias in their publications. There are several techniques for avoiding bias: When writing about ethnic groups, for example, use the term that is currently preferred by most members of that group. Always use nonsexist language. Whenever you are writing about individuals (research participants, people in general), select words that are free of gender bias. Because some sexist words are so embedded in our language, this can seem awkward at first instance. For example, do not talk about the benefits of psychological research for "man" or "mankind" when you really mean "all people" –say "people" instead. Don't refer to a participant as "he" (unless all your participants really were male); use "he or she" or "they" instead. If you use "he or she" (or "she or he"), however, do so sparingly or the usage becomes distracting. Never use contrived contractions, like "she", or "he/she", which suggest that the genders are interchangeable.

When discussing people of both genders, most experienced researchers try to construct gender-free sentences instead. Often, just pluralizing the sentence can take care of the problem. Instead of saying, "When a subject arrived, he was….."; say instead, "When subjects arrived, they……," or another method is "when the client arrived, the client was looking depressed.."and so forth. Never assume that a client or researcher is male, at least 50% of those currently graduating with Ph.D. in psychology are women.

Avoid language with negative overtones. Do not call "lesbians" and gay men "homosexuals". Use nonhandicapping language when referring to people with mental or physical disabilities. Referring to your participants as "20 people diagnosed with obsessive-compulsive disorder" is much better than saying "20 obsessive-compulsives." Similarly, do not use the name of a physical disability to characterize a person. Saying "a person living with paraplegia" is much better than saying "a paraplegic."

One of the most common pitfalls of a first report is taking too much for granted. After you have worked on a study for some time, what you did might seem completely obvious. The problem is that an element that seems obvious to you might not be obvious to your readers unless you explain it.

Remember that the whole point of writing a report is to communicate information. A reader should be able to understand what you did and why simply by reading the report.

1.5 FORMAT FOR REPORTS IN PSYCHOLOGY AREA

Psychology reports follow the format set by APA. The fifth edition of the Publication Manual of the American Psychological Association (2001), makes the job of reporting easier for researchers as well as readers. As early as 1928, psychologists and other social scientists recognised the need for standard for presenting research data. The first "manual" was a seven-page article that appeared in Psychological Bulletin in 1929. The present manual spans several hundred pages and contains material on all aspects of appropriate content as well as detailed explanations of specific layout and style requirements.

The need for a standard format for reports becomes clear when you consider the tremendous volume of research going on today. The APA alone publishes more than 40 journals, which translates to several thousand articles per year. Even more are published in the many non-APA psychology journals. Many thousands more are reviewed and not accepted for publication. If everyone used a different format for writing reports, reviewers would have a hard time evaluating the work. and readers would have trouble locating the information they need.

The place for creativity is the design of your experiment, not the format of your report, which should conform to APA standards. Although some details of format vary slightly from one journal to another, most follow the overall structure outlined from one journal or another, most follow the overall structure outlined here.

Self Assessment Questions

1) What is the purpose of a Report?

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2) Elucidate the writing style of the report.

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3) What are the various do's and don't's of report writing?

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4) What format should be followed in report writing in psychology area?

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1.6 MAJOR SECTIONS IN A REPORT

Every research report must contain the following major standard components:

- A Title
- An Abstract
- An Introduction
- Method
- Results D
- Discussion
- References.

Many reports contain additional features such as footnotes, tables, or figures (graphs, pictures, or drawings). We will look at each of these above mentioned components in detail below. Later, we will look at layout requirements and additional components.

1.6.1 Title

Reports need a descriptive title that gives readers an idea of what the report is about. The simplest way to achieve this goal is by including both the independent and dependent variables of the study in the title, stating the relationship between them. Here are some examples from articles: "Negative Ions and Behaviour: Impact on Mood, Memory, and Aggression among Type A and Type B Persons. Another title for example could be "Anxiety, Fear, and Social Affiliation". As is seen in these titles they are clear cut and give an idea as to what the inside contents would by and large be. Titles like "A Psychological Experiment" or "An Experiment on Music" are for too vague to help a reader who is trying to track down specific information.

The recommended title length, however, is about 10 to 12 words so that the titles must be concise, self-explanatory and catchy. According to Publication Manual of the American Psychological Association (1998) Fourth Edition a title should summarise the main idea of the paper simply and, if possible, with style. It should be a concise statement of the main topic and should identify the actual variables or theoretical issue under investigation and the relationship between them. An example of a good title is "Effect of Transformed Letters on Reading Speed."

A title should be fully explanatory when standing alone. Although the principal function of a report is to inform readers about the study, a title is also used as a statement of article content for abstracting the information services, such as APA's Psychological Abstracts and PsycINFO database. A good title easily compresses to a short title and can be used for editorial purposes.

Titles are commonly indexed and compiled in numerous reference works. Therefore, one must avoid words that serve no useful purpose as they only increase the length of the report and can mislead indexers. For example, the words method and results do not normally appear in a title, nor should such redundancies as "A Study of" or "An Experimental Investigation of" begin a title. Avoid using abbreviations in a title and remember that the recommended length for a title is 10 to 12 words.

Author's name and institutional affiliation: Every manuscript has a byline consisting of two parts: the name of the author and the institution where the investigation was conducted . Details are given in the following section

1.6.2 Author's Name

The preferred form of an author's name is first name, middle initial, and last name because this reduces the likelihood of mistaken identity. To assist researchers as well as librarians, use the same format for publication throughout your career; that is, do not use initials on one manuscript and the full name on a later one. Determining whether Rashmi A. Khurana is the same person as R.A.Khurana, A.Khurana, or R.Khurana will be be difficult, particularly when citations span several years and institutional affiliations change. Omit all titles (e.g., Dr., Professor) and degrees (e.g., PhD, PsyD, EdD). The correct way of author title is: Rashmi A.Khurana

1.6.3 Institutional Affiliation

The affiliation identifies the location where the author or authors who conducted the investigation belong to, which is usually an institution. Include a dual affiliation only if two institutions contributed substantial financial support to the study. Include no more than two affiliations. When an author has no institutional affiliation, list the city and state of residence below the author's name. If the institutional affiliation has changed since the work was completed, give the current affiliation in the author identification notes.

1.6.4 Running Head for Publication

The running head is an abbreviated title that is printed at the top of the pages of a published article to identify the article for readers. The head should be a maximum of 50 characters, counting letters, punctuation, and spaces between words. If the article is entitled, "A survey of sustainable life style amongst persons living in slum areas of Kolkata", the running head in all the pages will be "sustainable lifestyle"

1.7 ABSTRACT

According to Publication Manual of the American Psychological Association (1998) (Fourth Edition) an abstract is a brief, comprehensive summary of the contents of the article. It allows readers to survey the contents of an article quickly and, like title, is used for abstracting and indexing formation services to index and retrieve articles.

A well-prepared abstract can be the most important paragraph in your report. Most people will have their first contact with an article by seeing just the abstract, usually on a computer screen with several other abstracts. Readers frequently decide on the basis of the abstract whether to read the entire article. The abstract needs to be rich in content, readable, well organised, brief, and self-contained. Below the abstract , write the key words that appear in the text of the report.

1.7.1 Accuracy

Ensure that an abstract correctly reflects the purpose and content of the report. One should not include in the abstract, all those information which do not appear in the body of the report. If the report covers a replicated research work, this has to be mentioned in the abstract clearly. Compare the with the outline of the report's headings, which would help to verify the accuracy of the abstract.

1.7.2 Self-contained

All abbreviations should be explained and expanded. The names should be clearly spelt out of difficult terms and terminology. The unique terms should be described and names of the authors whose citations have been quoted must be given full acknowledgement and should be mentioned in bibliography or references.

1.7.3 Concise and Specific

Make each sentence maximally informative, especially the lead sentence. According to the APA, Abstracts should not exceed 960 characters and spaces, which is approximately 120 words. Include in the abstract the major four or five concepts that are in the report and the research that had been conducted. Add in the abstract the results and conclusions and if possible number them.

1.7.4 Ways to Conserve Characters

It is important that digits are used

One should use abbreviations, but these must be explained clearly.

Use the active voice (but without the personal pronouns I or we).

1.7.5 Non-evaluative Type of Abstract

The abstract should not be evaluative unless the research itself is an evaluative research. The facts should be mentioned briefly where needed but no comments should be added to the abstract..

1.7.6 Coherent and Readable

The abstract should be written in a simple language, highlighting the main points. It should be in the present tense , must be written in a cogent coherent manner. Use the third person rather than the first person. Avoid unnecessary jargons. Describe briefly the methodology used in the research, specify the characteristics of the sample and indicate the tools used for collecting data etc. At the end give the findings briefly and conclude, where needed you can give the significance levels at which the findings were found valid and which hypotheses were validated etc.

An abstract that is accurate, succinct, quickly comprehensible, and informative will increase the readability and interest of the readers. An abstract is a summary of the report and hence should be written to the extent possible in the same general style you use in the report.

The abstract should be a concise synopsis of the experiment, should contain a statement of the problem studied, the method, the results, and the conclusions. Summarise the procedures used in the experiment and state the results briefly. You should also state the important and interesting conclusions you reached.

At this point you may be thinking, "All that in 120 words or less? You must be kidding!" Though difficult to write, abstracts are well written with practice. Those who find it difficult to write the abstract before writing the report, can also write the abstract after completion of the report.

If the abstract is poor, uninteresting, or uninformative, readers might not go on to read the entire article. That is why it is especially important to include all the pertinent facts of an experiment in the abstract. Good abstracts make our research more accessible to our readers. Good titles do the same because the title determines how an article will be indexed.

Self Assessment Questions

1) What are the major sections in a report?

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2) What is an abstract and why is it important in a report?

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3) How would you ensure accuracy, retention of character in an abstract? Elaborate.

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4) What are the important characteristics of a good abstract?

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1.8 INTRODUCTION TO RESEARCH REPORT

According to Publication Manual of the American Psychological Association (2001) (Fourth Edition) introduce the topic of the research that has been conducted. The introduction should be able to give an idea to the reader what the topic is all about, how did the topic emerge and what made the researcher take up the topic. Were there any salient studies that stimulated this research or was this research a replication

of a study that had already been conducted by someone else but wanted to confirm the methods and results, etc. Hence the specific problem has to be spelt out and the research strategy clearly mentioned.

The introduction must contain the purpose of the research which should be clearly stated. It must also contain by and large what kind of research design is being contemplated and what kind of results are being expected etc. Every research is related to some theoretical proposition and it must be made clear in the introduction what are these propositions or theories on which the entire research is based. Which studies in particular have influenced the conduct of the present research.

Introduction is the main pillar of the research report. It provides the reader with the rationale behind the research and provide a view of what is going to be in the research report.

1.8.1 Develop the Background

In introduction an effort should be made to provide those studies that have influenced the present one, and also a brief literature review must be provided that should indicate which of these studies and methodology have influenced the researcher to undertake this topic. While doing the review, latest literature should be the focus though one or two classic studies in this area could also be mentioned. The literature review must not delve deep into the historical aspects as it would be an enormous waste of space and material, but the historical aspects must be directly relevant to the topic concerned. What is more important is studies which have used some of the variables used in the present research if had been used also by other studies and they had come to the same or similar or different conclusions, these studies must definitely be included in the review as part of introduction. The introduction should indicate the methodology used and the research design formulated, method used for selecting the sample for the study and the method by which the data was collected, the tools and instruments used in the study, the hypotheses formulated and the statistical tools used to analyse the data. Such exposition of the various activities that underlie the research when reported in the introduction, would indicate not only the researcher's scholarly approach to the problem but the comprehension the person has of the problem and how the individual is going to overcome many of the pitfalls and shortcomings of the earlier research. The introduction should demonstrate the logical continuity between previous and present work.

Controversial issues, when relevant, should be treated fairly. A simple statement that certain studies support one conclusion and others support another conclusion is better than an extensive and inconclusive discussion. Whatever the personal opinion of the while expressing that opinion the researcher must avoid any kind of animosity or howstility or severe criticism or personal attack. Every care must be taken by the researcher not to support or justify one's position by citing established authorities out of context.

1.8.2 State the Purpose and Rationale

After the researcher has introduced the problem and developed the background material, one is in a position to tell what is the next step and how to go about it. Make this statement in the closing paragraphs of the Introduction. At this point, a definition of the variables and a formal statement of the hypotheses should be able to give clarity to the paper. The researcher should bear in mind the following questions in closing the Introduction: What variables did I plan to manipulate? What results did I expect and why did I expect them? The logic behind "Why did I expect them?"

should be made explicit. The rationale for each hypothesis should be clearly spelt out.

The Introduction of the research report sets the stage for what follows. A good Introduction tells readers what the researcher is doing and why. It introduces to the reader the hypothesis that is being empirically tested and how it will be tested. As one starts the Introduction, one should think about what readers must get out of it. The focus should be the experiment's hypothesis. After reading the Introduction, readers should have answers to the following questions:

- What problem are you studying?
- What does the prior literature in the area say about the problem?
- What is your hypothesis?
- What thinking led up to that hypothesis?
- What is the overall plan for testing the hypothesis?
- Do you make any specific predictions about the outcome of the study?

An Introduction usually begins with a description of the general topic area in which the research falls under (for example, education, health). The description should provide evidence for the importance of studying the topic chosen by the researcher (Pyrczak & Bruce, 2000).

1.8.3 Method of Writing the Introduction

Some writers use a funnel analogy for writing an Introduction, that is they begin with the broad topic area and gradually narrow the focus of writing to the specific research question the experiment was designed to answer. The Introduction includes a concise review of the research literature that led to the setting up of hypothesis or that which lent support to it.

For instance, the researcher might show how prior findings have been inconsistent or ambiguous; the researcher may also explain how the experiment might clarify the problem. It is not necessary to cite every bit of research that has ever been done in the area, but the researcher must cite only those which are most essential to understanding the nature of the problem being investigated.

The researcher must be careful to show how and on what basis the hypotheses were formulated so that the readers should be able to follow the thinking that took the researcher to work on the problem. The researcher should not assume that anything is obvious to the reader as the report is being written for an audience who may or may not be familiar with the topic. Hence some review is important of the earlier research but not an exhaustive one.

Also in the introduction one should be very careful about the citations, in that the researcher should cite all articles which have been used for preparing the background for the research topic (experiments), and from which the hypotheses for the study have been derived. If any other source had influenced the researcher to formulate the research design or set up the hypothesis the same should be mentioned.

The hypothesis should, be explicitly stated in the Introduction though only towards the end of introduction. That is, after the researcher had explained the research and the thinking behind it. Identifying the independent and dependent variables are very important. In addition if the researcher wants to mention something about general procedures followed in the research, that may also be added in the introduction.

The researcher might also want to include a sentence or two about operational definitions to prepare readers for what follows in the report. If one has made predictions about the outcome of the study, by all means it must be stated so in addition to explaining why a certain type of results are expected from the research. The introduction should be so well written that it must prepare the reader for the method section. Rosnow and Rosnow (2001) explained that the introduction provides the rationale for the study and prepares the reader for the methods the researcher has chosen.

A good Introduction has three components, as given below:

i) It should indicate the need for this research

ii) Review of relevant literature directly related to the topic

iii) Rationale for the research.

Let us elaborate these now. The researcher must give a clear and definitive statement of the problem and must develop it logically in the light of pertinent studies. He must indicate the need for the present research and why the problem is important in terms of theory and/or practice.

Secondly, the researcher must try to establish an understanding of the existing literature relevant to his or her study. He needs to connect logically the previous body of literature with the present study.

The third and final component of Introduction is to formulate a clear rationale of the hypotheses to be proposed. Every hypothesis must be clearly stated so that it is possible to scientifically test it. Different variables and terms should be properly defined and investigated.

1.9 GENERAL GUIDELINES TO WRITE INTRODUCTION

Start this page by retyping your title (centered), then begin typing the section (on the next double spaced line) using normal (5 space indented) paragraphs. Do not type the word Introduction.

The main purpose of this section is to tell the reader why you performed the study. In other words, you have to inform the reader of the research question and indicate why it is important, and how is it uniquely different as compared to previous studies.

It starts out broad and becomes more and more specific. For example, you might begin by defining any relevant terms, then go on to review the relevant literature.

Avoid an exhaustive and historical review. Then go on to make clear the connection between previous research and the present work.

You might include any hypotheses and the rationale for them.

The final paragraph usually contains a statement which clearly and explicitly states why the study was performed, such as 'The purpose of this study was to...' or 'The present study was designed to investigate the... ' Be especially careful not to use a sentence of this type earlier in your Introduction.

Thus, this section should contain an absolute minimum of four paragraphs: the general Introduction, the literature review, the connection of the present study to the literature and the explicit statement of purpose.

Self Assessment Questions

1) How do you write "introduction" to a report?

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2) What is meant by "develop the background for writing introduction"? What are the important things the writetr should do?

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3) Discuss the different methods to write introduction and which would you follow and why?

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4) Put forward the Guidelines for writing introduction.

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1.10 LET US SUM UP

A report is a written document which contains information regarding a topic which has been dealt with by a person. The purpose of report in the field of psychology is to communicate to others what has been experimented or researched on, and what has been the result of such an effort. Through the report the researcher conveys to the reader what has been done in the research, reports the methodology and then the findings.

Research reports are written in a scientific writing style, which is fact-filled, highly structured, and more concise than other kinds of writing. The goal of an experimental report is to provide objective information and not to entertain the reader or express opinions.

Whenever a report is written many sources are referred from where varied types of information are obtained , and the sources will have to be acknowledged. The report should use a formal or informal style, and must avoid personal pronouns like I or we, etc.

A research report should be unbiased, should not use any contrived contractions, like "she", or "he/she", should not have any negative overtones, should follow a standard format, must have a Title, An Abstract, An Introduction, Method, Results D, Discussion and References.

Reports need a descriptive title that gives readers an idea of what the report is about. The recommended title length, however, is about 10 to 12 words so that the titles must be concise, self-explanatory and catchy. A title should be fully explanatory when standing alone. Titles are commonly indexed and compiled in numerous reference works.

The preferred form of an author's name is first name, middle initial, and last name because this reduces the likelihood of mistaken identity. The affiliation identifies the location where the author or authors who conducted the investigation belong to, which is usually an institution.

The running head is an abbreviated title that is printed at the top of the pages of a published article to identify the article for readers. The head should be a maximum of 50 characters, counting letters, punctuation, and spaces between words.

A well-prepared abstract can be the most important paragraph in the report, as most people will have their first contact with an article by seeing just the abstract, usually on a computer screen with several other abstracts. The asbstract should be accurate, self contained, concise and specific, non-evaluative in nature, coherent and readable. Every research report should have an introduction, which must contain the purpose of the research which should be clearly stated. Introduction is the main pillar of the research report. It provides the reader with the rationale behind the research and provide a view of what is going to be in the research report.

For this one has to develop the background, give a precise and specifically related reviews to the research topic, develop hypothesism, indicate the methodology and how the research is going to be carried out and what results are expected and why. The introduction should contain the rationale for the study.

Introduction can be in any style, of going from general to specific , should indicate the need for this research, review of relevant literature etc.

1.11 UNIT END QUESTIONS

1) Elucidate comprehensively the various techniques for writing a Research Report in a scientific manner.

2) What are the prerequisites for writing an Introduction component in a Research Report?

3) Discuss the strategic significance of an Abstract in a Research Report.

4) Write a short note on framing of Title in a Research Report.

5) Carve out a befitting Research Report Introduction with the help of an example.

1.13 GLOSSARY

Research Report : Contains all information, such as the methodology used, research design, conduction of the research and the results obtained.

Introduction : An important component of a report which provides the need for such a research, the rationale and hypothesis and gives broadly an idea about the uniqueness of the study and what to expect from the results.

Abstract : This gives in brief what the research was all about and what is in the report.

Hypothesis : This is a conjectural statement regarding the relationship amongst two or more variables and indicates which is independent variable and which is dependent variable.

Rationale : This provides the reasons for undertaking the research and use of a specific methodology and conducting of the research.

1.12 SUGGESTED READINGS

Publication Manual of the American Psychological Association (Sixth Edition, 2009). American Psychological Association. Washington, DC.

Singh, AK. (2009). *Test Measurements and Research Methods in Behavioural Sciences* (Fifth Edition). Bharti Bhawan Publishers & Distributors.

UNIT 2 REVIEW OF LITERATURE

Structure

2.0 Introduction

2.1 Objectives

2.2 Purposes of Review of Literature

2.3 Sources of Review of Literature

- 2.3.1 Journals and Books
- 2.3.2 Reviews
- 2.3.3 Abstracts
- 2.3.4 Indexes
- 2.3.5 Internet
- 2.3.6 Doctoral Dissertations
- 2.3.7 Supervisors / Research Professors

2.4 Types of Literature

- 2.4.1 Subject Specific Books
- 2.4.2 Grey Literature
- 2.4.3 Official Publications
- 2.4.4 Writing Aids
- 2.4.5 Journal Articles

2.5 Writing Process

2.6 How Old Should the Literature Be

2.7 Preparation of Index Card

2.8 Let Us Sum Up

2.9 Unit End Questions

2.10 Suggested Readings

2.0 INTRODUCTION

Review of literature is a collective body of works done by earlier scientists and published in the form of books or in the form of articles in journals or published as monograph etc. Every scientific investigation starts with a Review of Literature. In fact, working with the literature is an essential part of the research process which help generate ideas, helps in developing significant questions and is regarded as instrumental in the process of research design. In this unit we will be dealing with the review of literature, how to go about it, what is its importance and how the review should be organised and how to relate it to the present research report.

2.1 OBJECTIVES

After reading this unit, you will be able to:

- discuss the purposes of review of literature;
- explain the sources of review of literature in psychology;

- identify different types of literature;
- learn about the writing process; and
- describe the process of preparation of index card.

2.2 PURPOSES OF REVIEW OF LITERATURE

A literature review is part of a report. It provides considerable information on the topic being researched and the various works that had gone on in the field over the years. These materials are gathered by the researcher from many sources such as journals, books, documents etc. The review of such a literature could be a matter of fact presentation of the information or it could be a synthesis of a large number of information and put together subject wise for the purpose of understanding. It can be just a simple summary of the sources, but it usually has an organisational pattern and combines both summary and synthesis. In summary all the information is synthesised and given in a capsule form. It synthesises and organises the entire information in terms of its relevance and appropriateness to the topic of research. It might give a new interpretation of old material or combine new with old interpretations. Or it might trace the intellectual progression of the field, including major debates. And depending on the situation, the literature review may evaluate the sources and advise the reader on the most pertinent and relevant information.

Difference between Literature review and Academic research report

The question arises as to how the literature review differs from an academic research paper. While the main focus of an academic research paper is to develop a new argument, a research report will contain the literature review as one of its chapters. In a research report one uses the literature as a basic foundation and support for newer ideas and insights into the research topic of interest. Literature review on the other hand summarises and synthesises the many arguments and literature and research findings gathered from such a review and puts forward arguments in favour or against the particular topic and its findings.

Materials to be included in review of literature

The next question is regarding how many and how much of materials to be included in review of literature. There is no hard and fast rule about this. The researcher has to definitely include the materials from classic and pioneering works in the area. In addition the researcher should also include all the relevant research works published more recently especially in the last 5 to 10 years.

As for the types of sources to be consulted for review of literature, this includes books, journal articles, monographs, documents, grey literature such as unpublished documents or research papers read at some conferences etc. In addition the internet is an important source from where articles and abstracts could be downloaded for this purpose.

Once all the materials have been gathered from different sources as mentioned above, the researcher should organise the same according to the year of publication and the subject matter must be organised to give meaning to the entire literature gathered keeping in view the present research topic of interest to the researcher.

The researcher can evaluate these materials on the basis of the methodology used, the research findings arrived etc. The researcher could also include in such a review certain minimal and directly relevant historical account regarding the research topic.

The specific purposes of a Review of the Literature are enumerated below:

- *Identifying variables relevant for research*

When the researcher makes a careful Review of the Literature, he becomes aware of the important and unimportant variables in the concerned area of research. A careful Review also helps the researcher in selecting the variables lying within the scope of his interest, in defining and operationalising as well as in identifying variables which are conceptually and practically important. Thus a Review of the Literature, on the whole, prepares the researcher to formulate a research problem in which conceptualisation and practically important variables are selected.

- *Avoidance of repetition*

A Review of the Literature helps the researcher in avoiding any duplication of work done earlier. A careful review always aims at interpreting prior studies and indicating their usefulness for the study to be undertaken. Thus prior studies serve as the foundation for present research. In some cases the duplication or replication of prior studies becomes essential. This is especially true when the researcher wants to test the validity of the earlier studies. In such a situation, too, a careful review helps the researcher in getting acquainted with the number and nature of the studies related to the present research whose validity is being assessed at present.

- *Synthesis of prior works*

Review of the Literature enables the researcher to collect and synthesise prior studies related to the present study. This, in turn, helps the researcher in building a better perspective for future research. A synthesised collection of prior studies also helps a researcher to identify the significant overlaps and the gaps among the prior works.

Determining meaning and relationship among variables

A careful Review of the Literature enables the researcher in discovering important variables relevant to the area of the present research. When significant variables are discovered, the relationship among them can be identified, Subsequently, the identified relationship is incorporated into different hypotheses. Thus, for conducting a scientific study, the relationship between the different variables must be explored by reviewing the literature so that a good context may be built up for subsequent investigations.

In addition to these specific purposes, there are some general purposes of the literature review:

- To argue for the relevance and the significance of the research question.
- To provide the context for one's own methodological approach
- To establish one's own credibility as a knowledgeable and capable researcher.
- To argue for the relevance and appropriateness of one's own approach.

2.3 SOURCES OF THE REVIEW OF LITERATURE

There are diverse sources of the Review of the Literature. Some of them are enumerated below.

2.3.1 Journals and Books

Different research journals and books relevant to the areas of interest are the primary sources of the Review of Literature. Most major libraries have a periodical section

where different types of research journals are made easily available. A research journal generally contains the publication of original research reports with their detailed methodology and results. Such journals contain original research reports with their detailed methodology and result. Such journals are referred and therefore are different from non-referred journals. A referred journal is one which reports only those articles which are carefully reviewed by the experts before publication. Often, the reviewer rejects several manuscripts and selects a few for publication. Similarly, books are also direct sources of the Review of Literature. Of these two, journals are regarded as more useful because they provide the researcher with the latest and up-to-date information relevant to the area of interest.

2.3.2 Reviews

Reviews are short articles that give brief information regarding the work done in a particular area over a period of time. Reviews are commonly published in journals, yearbooks, handbooks and encyclopedias. Reviewers select research articles of their interest, organise them contentwise, criticise their findings and offer their own suggestions and conclusions. Review articles are a good source for those investigators who wish to have all the relevant researches at one place without taking pains to look for them. Since the reviewers organise all the possible research papers of the relevant area in their review articles, review articles also provide the advantage of prior reviews.

2.3.3 Abstracts

Abstracts provide a summary of the research reports done in different fields Psychological abstract (Washington: American Psychological Association), and Sociological abstract (New York: Sociological Abstracts, INC) are the two common examples of abstracts. These abstracts are the useful sources of up-to-date information for researchers. In an abstract, besides a summary, researchers get all the relevant information such as the title of the Research Report, name of the author and the journal pagination information, etc., regarding the research article. The only limitation of abstracts is that they fail to satisfy those researchers who desire detailed information regarding the methodology and results of the research articles.

2.3.4 Indexes

Indexes show the titles of the research report without any abstract. The titles are categorised and arranged alphabetically in each category so that the researcher can locate any article of interest easily. The Education Index (New York: H W Wilson Co.) is a good example of an index. As indexes do not provide detailed information they keep many a researcher dissatisfied. They can be best regarded as the supplementary source which, if combined with other sources, can yield valuable information to the researchers.

2.3.5 Internet

Today Internet is a very easy and quick source of Review of Literature. Internet sites are very useful for providing easy access to original writings by important researchers. They also provide such an updated information on the topic that ordinarily is not available in the library. Internet sites also provide for useful bibliographies related to a particular researcher. Search on Internet also reveals some relevant professional societies and academic associations which can provide a lot of support to the studies in the concerned area. Such organisations also sometimes publish important papers or periodicals which can be of immense help to the researchers. Some publishers put

the brief content and extracts from the recently published books on the Internet and these can be of valuable help to the researchers. Sometimes, the Internet sites include articles extracted from encyclopedias which can also be very useful and informative as background reading. However, they are not normally suitable for citing in a report.

2.3.6 Doctoral Dissertations

Doctoral dissertations have also been a very good source of the Review of the Literature. In libraries of universities, doctoral dissertations are available. The researcher can choose the dissertations of their interest and find useful and relevant information there. There are no set forms for writing the research report in a doctoral dissertation but most dissertations contain chapters like an Introduction, Review of the Literature, Purpose of the Study, Method of the Study, Results, Discussion, Summary and Conclusion.

Some researchers prefer not to add a separate chapter on Discussion, Summary and Conclusion. Some do not add a separate chapter on the Review of the Literature but incorporate it into the Introduction itself. Thus the doctoral dissertations present the advantage of prior review. Ordinarily, it is not possible for the researcher to move through all the important libraries in the country to consult all existing doctoral dissertations. Hence, he/she can have access to those dissertations that interest him through Dissertation Abstracts International, which publishes the abstracts of the doctoral dissertations submitted to different universities. In India, the Survey of Research in Education (edited by M B Buch) does much the same function. The second Survey of Research in Education covering the period between 1972-78 has also been released. Recently, the listing of dissertation abstracts has been computerised through DATRIX in terms of the key words (usually words appearing in title of the dissertation).

2.3.7 Supervisors/Research Professors

Supervisors often know the literature well and are able to guide in right direction. They are the recognised authority on the topic or research problems. Therefore, they should be consulted and their suggestions and advices should be carefully analysed. It may also be that the other research professors have recently sourced and reviewed the literature or an area very close to the literature the researcher is seeking. So they also constitute one important source.

Whatever may be the sources of reviews, the process of reviewing literature itself is not above criticisms. Inevitably, the interpretation of findings insights derived, the manner in which conclusions are drawn are all solely dependent upon the judgments of the reviewer, In other words, such reviews fall prey to what is called subjective judgment.

2.4 TYPES OF LITERATURE

In order to work with appropriate literature it is essential that the researcher must be able to identify and find it. For this, he/she must have an understanding of various literature types. Some of the common types of literature are as under:

2.4.1 Subject-Specific Books

Introductory and advanced text books and research report can provide important background and context for the research. Such literatures also provide information about theory and method of the research.

2.4.2 Grey Literature

Grey literature means both published and unpublished materials that somehow do not have International Standard Book Number (ISBN) or an International Standard Serial Number (ISSN).

Grey literature is a broad category that includes unpublished research newspaper articles, conference paper and pamphlets, etc. During the course of doing research most researchers do Utilise one or the other type of grey literature.

2.4.3 Official Publications, Archives and Statistics

This type of literature serves the dual purpose. Firstly such literature can be a valuable source of background and contextual information and secondly, they can also be used as a source of secondary data, Document analysis and secondary data analysis are often based upon this type of literature.

2.4.4 Writing Aids

As its name implies, such literature generally offer a significant support during the process of writing and can be easily used to improve the linguistic style of the work. Such literature include dictionaries, bibliographic works, encyclopedias, thesauruses, yearbooks, books of quotes, almanacs, etc.

2.4.5 Journal Articles

This type of literature is very common among the researches. It popularity is due to several factors, First, journal articles are very credible. Second, they are often targeted for academic audience. Third, they possess. The trait of specialty. Fourth, they possess the regularity of production which meant that research articles are not only relevant but also current.

Self Assessment Questions

1) What are the major objectives of Review of Literature?

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2) Enumerate the prominent sources of Review of Literature.

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3) What are the prerequisites for organising the Review of Literature?

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4) Carve out a befitting Review of Literature with the help of an example.

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5) Explain in your own words a few of the following words.
Review of Literature, Journals, Indexes, Internet, Doctoral Dissertations.

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2.5 WRITING PROCESS OF THE REVIEW OF LITERATURE

Since the Review of Literature may be a very long chapter, it does need some form of structure. The simplest way of organising the research works is to discuss them in chronological order. But this may not prove to be appropriate in all situations. Another way is that one can group the works on different subjects together with the date of publication as the only criterion of order. But this may also be confusing. Still another way may be to base the structure on the different types of publications. For example, chapters from books, journal articles and single authored books should be separately grouped and structured. The basic aim of the Review of Literature is to use the literature for informing, establishing and arguing. In fact, the Review of Literature should go beyond the said report.

Find a focus

A literature review not the sources themselves. This means that the researcher will not just list the sources but but selectively use them in the research topic area. These can be accommodated in terms of themes, or issues and bring those sources together, and present them. Some of the questions the researcher should ask self are the following:

- Do they present one or different solutions?
- Is there an aspect of the field that is missing?
- How well do they present the material ?
- Do they portray it according to an appropriate theory?
- Do they reveal a trend in the field?
- A raging debate?

One of the above themes should be picked up to focus the organisation of the review.

Construct a working thesis statement

The thesis statement should argue for a particular perspective on the material. Some sample thesis statements for literature reviews are as follows:

The current trend in treatment for congestive heart failure combines surgery and medicine.

More and more cultural studies scholars are accepting popular media as a subject worthy of academic consideration.

Consider organisation

Once the statement has been made, what is the most effective way of presenting the information? What are the most important topics, subtopics, etc., that the review needs to include? And in what order should they be presented? The researcher should develop an organisation for the review at both a global and local level:

Cover the basic categories

Just like most academic papers, literature reviews also must contain at least three basic elements: an introduction or background information section; the body of the review containing the discussion of sources; and, finally, a conclusion and/or recommendations section to end the paper.

Organise the body of the report

Once the basic categories are in place, then the researcher must consider how the sources should be presented within the body of the report.

To work out an overall organisational framework for the review, the following three typical ways of organising should be considered

- *Chronological Method*

If your review follows the chronological method, you could write about the materials above according to when they were published. For instance, first you would talk about the studies of the 19th century,then about the book published in the 1970's and then end up with articles about the topic in the recent years.

- *Method By publication*

If the order demonstrates a particular trend, then the researcher can arrange the reviews in the order of publication chronology. For instance, you could order a review of literature on the psychological aspects of suicides, if the progression revealed a change in suicidal practices over the years.

- *Method By trend*

Another way to organise the resources is to examine the sources under another trend such trends in couple suiocide or suicidal pact etc. Under this method, the researcher would combine the recent studies on suicidal pacts, of a century ago with those that are available today.

Thematic reviews of literature

Thematic reviews of literature are organised around a topic or issue, rather than the

progression of time. However, progression of time may still be an important factor in a thematic review. For instance, the suicidal review could focus on the development of the self esteem or disappointment in love affair leading to suicide. These studies could be organised chronologically. The only difference here between a "chronological" and a "thematic" approach is what is emphasised the most: the reason of injury to one's self esteem leading top suicide.

A methodological approach

This approach differs from the two above in that the focusing factor. Here the focus is on the method used by the researcher. For the suicidal issue, one methodological approach would be to look at cultural differences between the method of suicides. Or the review might focus on the economic impact of suicides. A methodological scope will influence either the types of documents in the review or the way in which these documents are discussed.

Once you've decided on the organisational method for the body of the review, the sections to be included should be easy to figure out. They should arise out of the organisational strategy. In other words, a chronological review would have subsections for each vital time period. A thematic review would have subtopics based upon factors that relate to the theme or issue.

Sometimes, though, one might need to add additional sections that are necessary for the study, and a few are given below:

Current Situation: Information necessary to understand the topic or focus of the literature review.

History: The chronological progression of the field, the literature, or an idea that is necessary to understand the literature review.

Methods and/or Standards: The criteria used to select the sources in the literature review or the way in which the researcher presents the information. For instance, one may explain that your review includes only peer-reviewed articles and journals.

Questions for Further Research: What questions about the field has the review sparked? How will the researcher use the review for further work in the area?

O'heary (2004) has recommended that for writing a good literature review, the following steps should strictly be followed:

- *Relevant reviews*

The researcher should give a look on the literature reviews done in several of the journal articles, From these reviews, good and relevant reviews should be sorted and this depends upon the research skills of the researchers. Supervisor should help him in selecting the relevant and good reviews.

- *Write critical annotations while going through the various reviews*

The researcher should sort and organise the annotations of the reviews by themes, issue of concern and common limitations, etc While doing so, some patterns would start emerging and this would, in turn, help in developing researcher's own argument.

- *To develop a structure*

The researcher should structure the potential reviews according to the most urgent needs such as topical themes, arguments that the researcher wishes to establish, etc.

The structure so developed is always subject to modification with the emergence of new thinking.

- *To write purposefully*

The researcher should note that he can review the literature without any agenda but he cannot write a formal literature review without any definite agenda or aim. The reader must know the reasons why and what are you telling them.

- *Use the literature to support the argument*

The researcher should not use the review only for reporting or borrowing the arguments from others rather he should use the literature for generating ideas that may help or support his own arguments.

- *Make the literature review an ongoing process*

The researcher should make the literature review an ongoing process. In other words, the literature review should answer the researcher's question, theories and methods and these should help in setting the parameters of the literature review. Thus literature review becomes a cyclical process and should often have a moving target.

- *Get plenty of feedback*

The researcher should not wait upto the last minute of writing process. Whatever has been written should be passed over to supervisors and other experts for their feedback. Early feedback gives a chance for rethinking and modification of ideas being incorporated in the writing process.

- *Remain prepared for redrafting*

In view of the suggestions through feedback, the researcher should redraft the review in a coherent manner so that the argument is reasonably supported.

Thus, writing the literature review is a complex task which can be made easy by following the above mentioned steps meticulously.

Self Assessment Questions

1) Discuss the strategies in writing a review.

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2) What are the steps to be followed in the writing processs of a review of literature?

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3) Why is feedback important in review of literature?

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4) Is redrafting necessary in review of literature? What advantage does it have?

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2.6 HOW OLD SHOULD THE LITERATURE BE?

One of the important questions for a researcher is: how old may the literature be? The simplest answer to this question is that it can be of any age, In fact, academic research is a cumulative activity. Each generation of researcher learns from the work of previous generation and current research basically depends upon the work and insights of the previous researchers. Since in any society the latest and contemporary research and publication are in great demand it is preferable to cite as many recent publications as possible.

Despite this, almost in any discipline, there are some seminal works which are centuries old but have become so significant that they are still being preferred by the researchers. Although their original ideas have been modified by the subsequent researchers over the years, their original spirit and views still remain significant and are held in considerable esteem. For example, the work of Sigmund Freud in the field of Psychoanalysis is of about 150 year back but his ideas, theories, viewpoints are so pertinent and of importance to any researcher of today, that working in this field is bound to have these included in the Review of the Literature.

However, it would be a healthy suggestion for researchers that they should always take precaution in citing older works unless they are confident and convinced in quoting them.

2.7 PREPARATION OF INDEX CARD FOR REVIEWING AND ABSTRACTING

After going though the different sources of the Review of the Literature, researchers prepare their own review and abstract on the index card. Usually, for the purpose, a 6" × 10" index card is recommended. In most journal articles, an abstract in about 150 words is provided. The researcher can incorporate it in the abstract being written. Where the article seems to be very important and relevant, the researcher can prepare a more detailed version. Usually, the abstract, thus prepared, is divided into three parts.

i) The first part consists of the purpose and hypothesis of the study. The researcher should write down the purpose of the study in not more than two lines. If the

hypotheses are small. they can be recorded varbatim but if they are lengthy, they should be synthesised.

ii) The second part consists of the methodology of the study in which size of the sample, nature of the population, methods for measuring or manipulation of the variables, methods of data collection, designs and statistics are shown in synthesised form.

iii) The third part consists of the findings and conclusions. In this part, the researcher should briefly take down the findings relating to each hypothesis and also concisely the conclusion drawn by the author.

At the top of the index card, a full reference should be clearly written in exactly the same way in which it appears in the researcher's own reference list. There are different types of research formats but that which is followed by the Publication Manual of the American Psychological Association is widely popular and has been adopted by most of the important research journals. The researcher should never trust own memory for recall of the details of any research article and therefore, all the important and relevant details should be carefully noted down in the index card.

Thus the reviewing and abstracting of the literature on the index card, should be done carefully and systematically. Sometimes it has been reported that researchers trust their memory for recalling a particular detail. But this is not a healthy practice because they are apt to forget the details or their memory may be blurred after some time. Researchers should try their best to accommodate every important and relevant detail under the three common headings suggested above.

Self Assessment Questions

1) Is there any limitation to the period that one must go upto in reviewing literature?

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2) Why is the old literature important? Give examples.

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3) When we take materials from others work, how do we acknowledge the source? Give examples.

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2.8 LET US SUM UP

A literature review is part of a report. It provides considerable information on the topic being researched and the various works that had gone on in the field over the years. These materials are gathered by the researcher from many sources such as journals, books, documents etc. Literature review differs from an academic research paper in that the main focus of an academic research paper is to develop a new argument whereas a research report will contain the literature review as one of its chapters. To the issue of how many and how much of materials to be included in review of literature, there is no hard and fast rule about this. The researcher has to definitely include the materials from classic and pioneering works in the area. In addition the researcher should also include all the relevant research works published more recently especially in the last 5 to 10 years.

As for the types of sources to be consulted for review of literature, this includes books, journal articles, monographs, documents, grey literature such as unpublished documents or research papers read at some conferences etc. In addition the internet is an important source from where articles and abstracts could be downloaded for this purpose.

The specific purposes of a Review of the Literature are identifying variables relevant for research, avoidance of repetition, synthesis of prior works and determining meaning and relationship among variables.

There are diverse sources of the Review of the Literature, which includes, journals and books, reviews, abstracts, and indexes. Internet, doctoral dissertations are other sources. As for the types of literature available for write up, this includes, subject specific books, grey literature, official publications, writing aids and journal articles.

Since the Review of Literature may be a very long chapter, it does need some form of structure. The simplest way of organising the research works is to discuss them in chronological order. The researcher should not use the review only for reporting or borrowing the arguments from others rather he should use the literature for generating ideas that may help or support his own arguments.

Since in any society the latest and contemporary research and publication are in great demand it is preferable to cite as many recent publications as possible. In addition, there are some seminal works which are centuries old but have become so significant that they have to be included. As for preparing index cards the details were discussed. It may be added here that the reviewing and abstracting of the literature on the index card, should be done carefully and systematically.

2.9 UNIT END QUESTIONS

1) Why is review of literature important in a report?

2) What are the pre requisites of literature review? Provide examples

3) What are the various methods of writing the literature review

4) What steps do we follow when we go through the source of review?

5) Why are past work so important? Elucidate.

2.10 SUGGESTED READINGS

Publication Manual of the American Psychological Association (6th edition, 2009). American Psychological Association. Washington, DC.

Singh, AK. (2009). *Test Measurements and Research Methods in Behavioural Sciences* (5th edition). Bharti Bhawan Publishers & Distributors.

UNIT 3 METHODOLOGY

Structure

3.0 Introduction

3.1 Objectives

3.2 Definition and Purpose of Methodology

3.3 Subsections

3.4 Participants (Sample)

3.5 Apparatus and materials

3.6 Procedure

3.7 Design

3.8 Let Us Sum Up

3.9 Unit End Questions

3.10 Suggested Readings

3.0 INTRODUCTION

In the previous unit we discussed about how to write the review of literature and also its importance in a research report. This unit deals with methodology used in the research study about which the report is being written. As part of the research report, methodology is considered in terms of how the data were collected, what kind of research design was used and what was the expected result etc. Methodology is one which includes all about the plans worked out to conduct the study, the instruments that would be used in the study, number of persons (sample) who would be administered the questionnaire or who would be interviewed etc. and the statistical tool used for analysis of the data. This unit thus deals with the methods used in collecting information from persons selected for the purpose.

3.1 OBJECTIVES

After reading this unit, you will be able to:

- define methodology and explain its purpose;
- explain how the Research is conducted;
- define Methodology, Sample, Apparatus and Materials;
- explain the Procedure and Design adopted in the Research;
- describe the Methodology component in APA format Research Report; and
- explain the significance of Methodology in Research Report writing.

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3.2 DEFINITION AND PURPOSE OF METHODOLOGY

Methodology refers to the method by which the research is conducted. It subsumes under it the objectives of the research, the hypothesis, the sample selected for the purpose, the research design used, the tools selected for collecting the information from the sample subjects, and the statistical methods used to analyse the data so collected.

The purpose of the methodology to be written as part of the report is to inform the reader how the entire research was conducted. For example if a researcher wanted to find out if training and practice in yoga reduce tension, it must be shown who were the subjects who underwent the yoga exercises, and how many were there in that group etc. Also whether to compare the researcher also had a control group, which had been subjected to yogic exercises. In order to measure tension what scale did the researcher use and how did the researcher measure the variable. Whether the scale was having any validity and reliability quotients. Whether the mean scores on tension were calculated and the two groups were compared and what was the result. Such a description enables the reader to evaluate the appropriateness of the research methods and the reliability and the validity of the results. It also permits experienced investigators to replicate the study if they so desire.

If the report is an update of an ongoing or earlier study and the method has been published in detail elsewhere, the same may be referred to that source and in the report just to give a brief synopsis of the method in this section. In other words one need not repeat the methodology used by someone but can refer the reader to the original source so that the work that has been started on these subjects continued unabated.

3.3 SUBSECTIONS

Any elaborate writing has to have headings and sub headings so that understanding of the concepts and the materials become easier for the reader. It is both conventional and expedient to divide the Method section into labeled subsections. These usually include descriptions of the participants, the apparatus (or materials), and the procedure. For example the description of the participants will be in terms of age, sex, educational status and occupational status, their income etc. As for description of the apparatus or tool that are being used to collect the needed information, the tool could be a scale or a questionnaire which is used for collecting information. Whether this scale has a reliability and validity quotients and on which sample or population has that scale been standardised etc., have to be reported. As for the procedure, for example it would state how the sample of subjects were selected, whether the questionnaire etc were sent by post to the respondent or whether the researcher interviewed them etc. For example, selecting the sample could have been done randomly or by other methods which have to be indicated clearly in the research report. If the design of the experiment is complex or the stimuli require detailed description, additional subsections or sub headings to divide the subsections may be warranted to help readers to find specific information. Researcher's own judgment is the best guide on what number and type of subheadings to use.

Include in these subsections only the information essential to comprehend and replicate the study. Insufficient detail leaves the reader in doubt and many questions remain unanswered, while at the same time too much detail burdens the reader with irrelevant information.

Self Assessment Questions

1) How is Methodology indispensable in Research Report writing?

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2) What is the stict APA specification for writing Methodology sub-section in Research Report?

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3) Describe how the Methodology helps the research community to replicate the study?

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4) Carve out a befitting Research Report Methodology with the help of an example.

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General Guidelines for Methodology

This section tells the reader what are the pre requisites and guidelines to formulate a method of conducting a research. Unless essentially required, one need not start this section in a new page. It can be continuous with a centered heading regarding the guidelines.

The purpose of this section is to describe in detail how the researcher conducted the study. By reading this, any other researcher if interested may like to replicate the research study based on the information provided in this section.

The writing should be such that it should be highly professional . For instance it should be written in such a way as if it is written for a scientific journal. It must contain all information about the research, starting from the idea conceived, the literature reviews in regard to it and the research design used for the purpose. The writing should avoid all unnecessary details and the obvious things like that of for instance, “the data were displayed on the computer screen and recorded on the data sheet(s)”, etc.

For an experiment, this section is typically divided into four subsections, viz., (i) subjects, (ii) apparatus, (iii) design, and (iv) procedure. Design and procedure sections can be combined. In an experimental psychology or research methods of this type, a separate design section is typically required as the experiments are always elaborate and contain considerable procedures and steps. On the other hand in a survey research, such procedures are not involved and so a separate section as envisaged for experiments need not be used.

3.4 PARTICIPANTS

Researcher should present in this section all details about the participants or the subjects or the sample selected for research purposes. The subsection on participants (sometimes called subjects or sample) should give readers the important characteristics of the sample. It should answer key questions such as the ones given below:

1) How many participants did you have?

2) What are their relevant characteristics (age, sex, species, weight and so on)?

3) How were participants recruited or selected?

4) Were they paid or given any other incentive?

5) Give any additional information that might be important to understanding the experiment.

Remember that the reader will need to know the characteristics of the sample to assess the external validity of the results. If any participants dropped out of the study, the same has to be reported and the circumstances that led to the subject dropping out must be indicated.

Appropriate identification of research participants and clientele is critical to the science and practice of psychology, particularly for assessing the results (making comparisons across groups), generalising the findings, and making comparisons in replications, literature reviews, or secondary data analyses. The sample should be adequately described, and it should be representative (if it is not, give the reasons as to why the sample is not representative of the population from which it is drawn). Conclusions and interpretations should not go beyond what the sample would warrant. Also the method of selecting these subject should be made clear. For instance if for the purpose of yoga training some executives have been selected, from which companies have they been selected and why. How are these selected executives representative of the executive in many other companies. What were the incentives given to these executives to work for this project as respondents.

It must be clearly indicated as to the demographic characteristics of the sample population taken for the study. For example, the executives selected belong to what age group, what their years of experience is, what are their socio economic condition, health status etc. all these information should be provided. What kind of yoga technique has been used, and for how many days and whether the technique is a standardised one given to all the sample subject in the same way etc. These are extremely important for the interpretation of the result. The researcher has to describe the group specifically, as for example, whether they belong to any particular region or nation or belong to a particular community etc. If a control group has been taken up for the study, the same procedure in describing the group should be followed as was done in the case of experimental group. To determine how far the data can be

generalised, it may be useful to identify subgroups. For example, people belonging to Hindu religion were 65, Muslim religion 55, Christianity 25, Sikkhism,45 and so on. Such categorisation helps in analysing the data in terms of the differences obtained in regard to the religious affiliations and reduction of tension. Even when a characteristic is not a variable, the reporting of it may be useful for meta-analysis.

For non-human animal subjects, report the genus, species, and strain number or other specific identification, such as the name and location of the supplier and the stock designation. The researcher must give the number of animals and the animal's sex, age, weight, and physiological condition. In addition, the researcher should also specify all essential details of their treatment and handling so that the investigation can be successfully replicated.

This section must also provide the total number of subjects assigned to the experimental condition and the number of subjects to the control group which did not undergo the yoga training. It must also indicate if any one or more of the subjects or a few of them did not complete the training, and why they did not etc., have to be specified as this might affect the obtained results.

When a report is being written up, the researcher must clearly specify that the treatment of subjects (people or nonhuman animals) was in accordance with the ethical standards.

Self Assessment Questions

1) Discuss the relevance of Sample in Research Report writing.

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2) How is a sample chosen or selected?

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3) How do we know that it is a random sample that has been selected.

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4) What are the guidelines one should follow while writing about the participants.

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3.5 APPARATUS AND MATERIALS

This is sometimes called the materials section when the researcher or the experimenter uses very little mechanical or electronic equipment and the materials used are mostly paper and pencil.

The subsection on apparatus briefly describes the apparatus or materials used and their function in the experiment. Standard laboratory equipment, such as furniture, stopwatches, or screens, can usually be mentioned without detail. In case specialised equipments have been used then it is important to identify specialised equipments obtained from a commercial supplier by the model number of the equipment and the supplier's name and location. Complex or custom-made equipment may be illustrated by a drawing or photograph. A detailed description of complex equipment may be included in an appendix.

The researcher should use his judgement to decide which label is more appropriate for the study. In this subsection you should provide readers with a description of the equipment used, unless they are unusual in some way. Standard items like stopwatches, pencils, or tables and chairs do not have to be described in detail. However, refer to any ready-made, specialised equipment by name, manufacturer, size, and model number. Take a hypothetical example, The film clip was presented on an RCA 19-inch color monitor, model #318182. If you used a computer to present stimuli, describe the model and computer program used. Identify standardised tests by name and include a citation-for instance, "Subjects filled out the Social Desirability Scale." Also include a brief description of what the scale was designed to measure. If you build your own equipment or prepared your own stimulus figures or questionnaire, give the details. Sometimes an illustration or sample items need to be included. If the equipment or materials are extremely complex, the researcher can include a complete description in an appendix at the end of the report. Be sure to provide all the information essential for replication, including physical dimensions like length, width, and color if appropriate. Unless another measure is standard (as in TV screens), always give measurement in metric units, such as centimeters and meters.

The Materials section (sometimes called Apparatus, or Measures) is where you describe anything that you used in the study. This should include technical equipment, questionnaires, word lists, computer programs, etc. It does not need to include pens, paper, tables, or anything that was extremely obvious. It is very tempting to write the materials section as a list , but avoid the temptation and do not list them out. Always write in full sentences.

Where possible in this section, you should describe accurately the nature of the equipment. Note that some journals recommend that you report the precise model of a piece of equipment (e.g., tape recorder model number ST23451) though usually you can be more easy going than this by merely stating that you used a tape recorder, and everyone knows what you mean.

You should also include in this section full details of any stimuli that were used in the study (e.g., word lists, pictures, nonsense syllables etc.). If the materials, such as a word list, can be described briefly, the same should be included here. If it is long, then it should be included as an appendix. Don't relegate everything important to the appendix.

Important points to remember

Do not purposely start a new page for this section. Type the word Apparatus flush with the left margin and italicize it. On the next line, begin typing normal paragraphs.

Describe what materials were used and how they functioned in the study.

If you use a piece of equipment, you must give the model number, company, and state where the company resides (as a two-letter abbreviation).

You must give the dimensions (and perhaps other descriptive details) of any important items used in the study.

Standard equipment such as furniture, stopwatches, pencils and paper, can usually be mentioned without providing a lot of details. In fact, you may often simply mention these items in passing as part of the procedure.

Be careful not to describe procedures in this section. You should make clear what purpose the apparatus served, but do not give a lot of details on the use of the apparatus at this point. One hint in this regard is to avoid using action verbs in this section.

Self Assessment Questions

1) What importance do 'apparatus and materials' play in methodology?

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2) What are the important points to remember when we try to write this section on apparatus ad materials?

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3.6 PROCEDURE

This section should provide readers with a clear description of all the procedures followed in the experiment.

The subsection on procedure summarises each step in the execution of the research, Include the instructions to the participants, the formation of the groups, and the specific experimental manipulation. Describe randomization, counterbalancing, and other control features in the design, Summarise or paraphrase instructions, unless they are unusual or compare and experimental manipulation. In which case they may be presented verbatim. Most readers are familiar with standard testing procedures; unless new or unique procedures are used, do not describe them in detail.

If a language other than English is used in the collection of information, the language should be specified. When an instrument is translated into another language, the specific method of translation should he described (e.g.,) in back translation method of translation should be described (e.g., in back translation, one language is interactive process.)

Remember that the Method section should tell the reader what you did not how you did it in sufficient detail so that a reader could reasonably replicate you study,

Include information on how subjects were assigned to the different groups in the experiment (random assignment, selected by scores on a personality test, etc.).

Explain the experimental manipulation and the procedures you used for controlling extraneous variables (counterbalancing, and so forth). After reading this section, a person should know how to carry out the experiment just as you did it. "Participants were seated in a chair located approximately 2.85m from the television monitor." Any special control procedures you used should be identified here-for instance, "To control for order effects, the film clips were presented in counterbalanced order." You may want to include the exact instructions you gave to participants, particularly if the instructions constituted your experimental manipulation. Otherwise, simply summarise them.

One easy way to write a procedure section is to report everything step by step in chronological order. Use some discretion in reporting commonplace details; the reader does not need to be told the obvious. For instance, if you gave subjects a written test, it would be unnecessary to report that they were provided with pencils and were seated during the test. However, do report anything usual about your procedures. (Having to use the experimenter's back as a writing surface would be unusual, and you would need to report it.) Be sure to identify your experimental manipulations carefully. Describe how you measured the dependent variable. Always ask yourself whether some-one could replicate your experiment based on what you have said. By the end of the Procedure section, readers should be able to identify the kind of research design you have.

Unless the design is very simple and easily contracted from the written procedures, consider the option of including a subsection called Design. If you have chosen a complex factorial design, for instance, it can be very helpful to the reader if you include a design statement with the factor labels. For instance, in a 6 x 4 x 3 factorial design, write out the factor names along with the design. Specify whether the design was between subjects, within subjects, or mixed-for example, "The experiment was a 6 x 4 x 3 (Reinforcement x Food Deprivation x Age) between-subjects factorial design." In mixed designs, specify the within and between subjects factors, because they might not be obvious to the reader. For example, if reinforcement had been a within-subjects factor in this experiment, you could say instead, "Level of reinforcement was a within-subjects factor; food deprivation and age were between-subjects factors." As the design becomes more complicated, readers usually need more explicit help in structuring the plan of the experiment. Do what makes the most sense to clarify your study. Finally, specify the dependent variable: "The dependent variable was the amount of time it took to learn the maze".

This section tells the reader what the research\her actually did. This section should be clear, accurate and complete. Keep in mind whilst writing it that you are intending to give sufficient information so that a researcher could be repeat what you did, exactly. The section should be written in the past tense because it is a description of what you did, not a recipe for how to carry out your study. The Method section

usually has four distinct subsections, which are described below. (You might find in journal articles that they have not always included every sub-section or that they have included an additional section). However, it is worth emphasising again that while a student you should stick to the standard format that I am giving you. One of the purposes of writing a research report is to show your lecturers that you know what a research report should look like. If you change the basic format, it might present your research more clearly, but it will not demonstrate to your lecturers that you know what a research report should look like.

The Method section in your practical reports will probably include more details than those in a journal article. Journal editors prefer to keep Method sections short because they have a limited amount of space available.

In this sub-section, you describe precisely what you did while carrying out the study. This section is a full report of what happened, from the selection of the participants to the debriefing.

If your study was an experiment, then you should detail how participants were allocated to the different experimental conditions. If the design was a between-participants design, were participants randomly allocated to the different conditions (and if not why not)? If the design was a within-participants design, what method of counterbalancing was used and why. Do not simply say: "participants were randomly allocated to one of the conditions". Instead, describe how you decided which participants were allocated to what part of the experiment.

You should describe the instructions that were presented to participants – don't just say "participants were given the instructions". If there were written or standardised instructions then you might want to include them as an appendix. Occasionally the exact wording of instructions is important. If this is the case, then you should include the wording in the procedure. If you debriefed the participants, you should say so.

General Guidelines

Do not purposely start a new page for this section. Type the word Procedure flush with the left margin and italicize it. On the next line, begin typing normal paragraphs.

Carefully summarise each step in the execution of the study.

Indicate what a typical test, trial, or session involved.

Describe any phases that the study had or any instructions that the subjects received.

When referring to groups, try to use descriptive labels. For example, instead of saying Group 1 other experimental group, you might say the drugged group. Another technique in this regard is to use abbreviations that emphasise meaning. For example, There were three groups, including, the control group which received 0 mg/kg of morphine (M^0), a low dose group receiving 1 mg/kg of morphine (M^1), and a high dose group receiving 4 mg/kg of morphine (M^4).

3.7 DESIGN

In the Design section, you outline the structure of your study. The purpose of the design section is to give the reader an overview of the study – if your design was complex, it might be hard for the reader to understand it from a description of what you did. The design section is a little like the ingredients from a recipe – it provides the ingredients of your study, that you will use later on in the Method section.

You should state clearly the nature of the research that you carried out. Was it an experiment, a correlation study, a case study, etc.? If it was an experiment, did you use a between-participants design (different participants in each condition) or a within-participants design (same participants in each condition) - or was it a mixed-design (with both within- and between-participant conditions)?

Describe the variables that you measured and/or manipulated. If your design was experimental, you should describe the dependent and independent variables. In experimental designs, you should state the number of levels in (each of) the independent variables, and describe them.

Describing the dependent variable(s) means actually saying what they are and what they mean. You need to say more than "the dependent variable was the response the participants gave to the questionnaire."

General Guidelines

Do not purposely start a new page for this section. Type the word Design flush with the left margin and italicize it. On the next line, begin typing normal paragraphs.

Describe the design and clearly spell out the independent and dependent variables.

Indicate what the levels of the independent variables were, and whether the factor(s) were repeated, matched, or independent.

Describe how the subjects were assigned to groups.

Describe any control procedures used.

Self Assessment Questions

1) What are the general guidelines to follow in writing up about the design?

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2) Why are procedures important? Can we do without procedures?

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3) What guidelines one should follow in regard procedure?

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3.8 LET US SUM UP

Methodology refers to the method by which the research is conducted. It subsumes under it the objectives of the research, the hypothesis, the sample selected for the purpose, the research design used, the tools selected for collecting the information from the sample subjects, and the statistical methods used to analyse the data so collected.

The purpose of the methodology to be written as part of the report is to inform the reader how the entire research was conducted. It also permits experienced investigators to replicate the study if they so desire.

Any elaborate writing has to have headings and sub headings so that understanding of the concepts and the materials become easier for the reader. It is both conventional and expedient to divide the Method section into labeled subsections. These usually include descriptions of the participants, the apparatus (or materials), and the procedure.

In the participants section, the researcher should present all details about the participants or the subjects or the sample selected for research purposes. The subsection on participants (sometimes called subjects or sample) should give readers the important characteristics of the sample.

Appropriate identification of research participants and clientele is critical to the science and practice of psychology, particularly for assessing the results (making comparisons across groups), generalising the findings, and making comparisons in replications, literature reviews, or secondary data analyses.

This section must also provide the total number of subjects assigned to the experimental condition and the number of subjects to the control group which did not undergo the yoga training. It must also indicate if any one or more of the subjects or a few of them did not complete the training, and why they did not etc., have to be specified as this might affect the obtained results.

The next section is the materials section, which presents the materials used by the researcher. The Materials section (sometimes called Apparatus, or Measures) is where you describe anything that you used in the study. This should include technical equipment, questionnaires, word lists, computer programs, etc.

The next section procedure consisted of a clear description of all the procedures followed in the experiment. One easy way to write a procedure section is to report everything step by step in chronological order.

In the Design section, you outline the structure of your study. The purpose of the design section is to give the reader an overview of the study .

3.9 UNIT END QUESTIONS

1) Define methodology and indicate its purposes
2) What are the sub-sections that would go under methodology? Why are these sub-sections important?
3) What are all included in the Apparatus and materials section? What procedure one should follow in this regard?
4) What do we mean by ‘procedure’ in methodology? Enumerate the various factors that go into these.
5) Elaborate and discuss the ‘Design’. What all needs to be included in this section.

3.10 SUGGESTED READINGS

Publication Manual of the American Psychological Association (Sixth Edition, 2009). American Psychological Association. Washington, DC.

Singh, AK. (2009). *Test Measurements and Research Methods in Behavioural Sciences* (Fifth Edition). Bharti Bhawan Publishers & Distributors.

UNIT 4 RESULT, ANALYSIS AND DISCUSSION OF THE DATA

Structure

4.0 Introduction

4.1 Objectives

4.2 Definition, Description of Results

4.3 Statistical Presentation

- 4.3.1 Sufficient Statistics
- 4.3.2 Statistical Power
- 4.3.3 Statistical Significance
- 4.3.4 Effect, Size and Strength of Relationship

4.4 Results

4.5 Tables and Figures

4.6 Discussion

4.7 Table Checklist

4.8 Figure Checklist

4.9 Let Us Sum Up

4.10 Unit End Questions

4.11 Suggested Readings

4.0 INTRODUCTION

In the previous unit we discussed about the methodology to be written in the report. This unit deals with results. This is one of the most important chapters in the report and is of great value to the researcher and also to the reader. Results are the final outcome of a research exercise that had taken place with certain objectivity and scientific rigour. A description of the analysis of the data that had been anlaysed will be presented here. The method of presentation, the important aspects of presentation and the interpretation of the results will all be handled in this unit.

4.1 OBJECTIVES

After reading this unit, you will be able to:

- describe Results and Discussion component in APA format;
- analyse Results in a research report;
- explain the research in terms of the prevailing research;
- write a Research Report with special emphasis on Results and Discussion; and
- explain how to use a checklist.

4.2 DEFINITION AND DESCRIPTION OF RESULTS

Results mean in this specific context that the findings that have been obtained from the analysis of the data that the researcher had collected during conducting the

research on the topic of the research. Results clearly indicate whether a particular hypothesis has been validated or rejected and it also provides information of how far the obtained results are statistically significant.

The Results section summarises the data collected and the statistical treatment of them. First, briefly state the main results or findings, Then report the data in sufficient detail to justify the conclusions. Mention all relevant results, including those that run counter to the hypothesis. Do not include individual scores or raw data, with the exception, for example, of single-case designs or illustrative samples.

4.3 STATISTICAL PRESENTATION

When reporting inferential statistics (e.g., t tests, F tests, and chi-square), include information about the obtained magnitude or value of the test, the degrees of freedom, the probability level, and the direction of the effect. Be sure to include descriptive statistics (e.g., means or medians); where means are reported.

Always include an associated measure of variability, such as standard deviations, variances, or mean square errors. Assume that your reader has professional knowledge of statistics. Basic assumptions, such as rejecting the null hypothesis, should not be reviewed. If there is a question about the appropriateness of a particular test, however, be sure to justify the use of that test.

4.3.1 Sufficient Statistics

When reporting inferential statistics, include sufficient information to help the reader corroborate the analyses conducted.

For parametric tests of location (e.g, single-group, multiple-group, or multiple-factor tests of means), a set of sufficient statistics consists of cell means, cell sample sizes, and some measure of variability (such as cell standard deviations or variances).

Alternatively, a set of sufficient statistics consists of cell means, along with the mean square error and degrees of freedom associated with the effect being tested.

For randomized-block layouts, repeated measures designs, and multivariate analyses of variance, vectors of cell means and cell sample sizes, along with the pooled within-cell variance-covariance matrix, constitute a set of sufficient statistics.

For correlation analyses (e.g., multiple regression analysis, factor analysis, and structural-equations modeling), the sample size and variance-covariance (or correlation) matrix are needed, accompanied by other information specific to the procedure used (e.g., variable means, reliabilities, hypothesized structural models, and other parameters).

For non-parametric analyses (e.g., chi-square analyses of contingency tables, order statistics), various summaries of the raw data (e.g., the number of case in each category, the sum of the ranks, and sample sizes in each cell) are sufficient statistics.

For analyses based on very small samples (including single-case investigations), consider providing the complete data in a table or figure.

4.3.2 Statistical Power

Take seriously the statistical power consideration associated with your tests of hypotheses. Such considerations relate to the likelihood of correctly rejecting the tested hypotheses, given a particular alpha level, effect size, and sample size. In that

regard, you should routinely provide evidence that your study has sufficient power to detect effect of substantive interest,

You should be similarly aware of the role played by sample size in cases in which not rejecting the null hypothesis is desirable (i.e., when you wish to argue that there are no differences), when testing various assumptions underlying the statistical model adopted (e.g., normality, homogeneity of variance, and homogeneity of regression), and in model fitting

4.3.3 Statistical Significance

Two types of probabilities associated with the significance of inferential statistical tests are reported. One refers to the apriori probability you have selected as an acceptable level of falsely rejecting a given null hypothesis. This probability, called the alpha level, is the probability of a Type I error in hypothesis testing. Commonly used alpha levels are .05 and .01. Before you begin to report specific results, you should routinely state the particular alpha level you selected for the statistical tests you conducted:

An alpha level of .05 was used for all statistical tests.

If you do not make a general statement about the alpha level, specify the alpha level when reporting each result.

The other kind of probability refers to the a posteriori likelihood of obtaining a result that is as extreme as or more extreme than the actual value of the statistic you obtained, assuming that the null hypothesis is true. For example, given a true null hypothesis, the probability of obtaining the particular value of the statistic you computed might be .008. Many statistical packages now provide these exact values. You can report this distinct piece of information in addition to specifying whether you rejected or failed to reject the null by pothesis using the specified alpha level.

With an alpha level of .05, the effect of age was statistically significant, $F (1, 123) = 7.27$, $p = .008$.

Or

The effect of age was not statistically significant, $F (1, 123)$, $p = .012$.

The second example should be taken up only if you have included a general statement about the alpha level earlier in your report.

If you do not wish to report the exact probability, you can report the commonly used probability value that is nearest to it:

With an alpha level of .05, the effect of age was statistically significant, $F (1, 123) = 7.27$, $p < .01$.

Or

The effect of age was not statistically significant, $F (1, 123) = 2.45$, $p > .10$.

4.3.4 Effect, Size and Strength of Relationship

Neither of the two types of probability values reflects the importance (magnitude) of an effect of the strength of a relationship because both probability values depend on sample size. You can estimate the magnitude of the effect or the strength of the relationship with a number of measures that do not depend on sample size.

You are encouraged to provide effect-size information, although in most cases such measures are readily obtainable whenever the test statistics (e.g., t and F) and sample sizes (or degrees of freedom) are reported. For example, given an F ratio based on v^1 and v^2 degrees of freedom, the proportion of variance accounted for by the associated effect (K^2, as the generalisation of r^2) can be determined as $v_1 F/(v_1 F+v_2)$.

Self Assessment Questions

1) Define results . What does it give ? Describe its importance

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2) What is meant by statistical presentation? What is sufficient statistics?

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3) What do you understand by the term statistical power? How do we decide the power and indicate in our report.

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4) What is meant bystatistical significance at .05 or .01 level? How do we overcome Type I and Type II errors?

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5) Elucidagte the concept that effectof size contributes to strength of relationship.

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4.4 RESULTS

This section is where you present your data and analyses. The experimenter gives a description and not an explanation of the findings of the experiment. In order to

fulfill this requirement, the results section should include descriptive statistics (rather than the raw data) and statistical tests if used.

Include in this the degrees of freedom used, obtained values of inferential statistics performed, probability level, and direction of effect. Underline letters used as statistical symbols, such as "N", "F", "t", "SD", and "p." (Use underlining, not quotation marks. Since many Web browsers using underlining to indicate a link, avoid underlining within web pages.) Make reference to any figures and tables used.

The reference to the table or figure should be close to the relevant material in the text. Never use a figure or table without referring to it in the text.

Tables are often used when presenting descriptive statistics such as means, standard deviations and correlations. Pictures, graphs, and drawings are referred to as figures.

You should use as few tables and figures as possible. They should be used as supplements, not to do the entire job of communication.

The results section of a report should tell readers what statistical procedures you used and what you found. Findings are easier to understand if you begin with a brief summary of your principal findings stated in words. Then report the results of your statistical tests (F or t values, results from post hoc tests, and so on) and summary data (for example, and ANOVA summary table or a table that includes means and standard deviations.

Remember that we usually do not report individual scores unless we have a small N design. Tell readers what statistical tests you used to evaluate the data, along with the obtained values of test statistics. Indicate degrees of freedom and significance levels. Be sure that you have stated all group means included in the important findings. "Some measure of group variability (typically the standard deviation, SD) is required whenever you are reporting values of F or t. You should also state the significance level you selected, typically $p < .05$.

Here is an example. Suppose a student researcher replicated a prior finding from the literature that violent music videos can increase people's acceptance of violent behaviour. The student conducted an experiment testing the effects of watching either violent or nonviolent music videos on subjects' attitudes toward violence. She designed a questionnaire to measure the attitudes toward violence; the higher the score, the more accepting an individual was of violent behaviour. A between subject's t- test showed that the prediction was confirmed by her experiment. She was was able to reject the null hypothesis at $p < .05$.

So one can say that her results section can begin by stating, in words, what the researcher found:

As predicted, subjects expressed more positive attitudes toward violence after viewing violent music videos than after viewing nonviolent videos.

Then the researcher could report the results of herthe statistical tests and relevant summary data as for example, with an alpha level of .05, a t test indicated that attitude scores were significantly different after violent videos than after non-violent ones, $t (34) = 3.12$, $p <.01$.Subjects shown a violent music video were more accepting of violence ($M= 7.89$, $SD = 2.10$) than were subjects who watched a nonviolent video ($M= 4.20$, $SD = 1.89$).

The estimate of effect size is strongly recommended in the Publication Manual. It is usually reported right after the obtained statistical value and probability level, like this:

A t-test indicated that attitude scores were significantly different after violent videos than after nonviolent ones, t (34) = 3.12, p <.01 (r^2 = .22).

There are no hard and fast rules for presenting statistics as long as the presentation is complete, and the results are clear to the reader.

In a simple two group experiment, the results section would probably not be very long. But if you have a factorial design, you will have more results to report (main effects, interactions, post hoc tests, and the like).post hoc test, and the like). If you have more than one dependent measure, you might want to present the results for each measure separately. As with the simple experiment, begin by stating, in words, what you found. The report all the effects produced by your statistical tests and relevant summary data for each kind of effect.

Typically, we report main effects first, then go on the interaction(s). Finally, give the results of post hoc tests or other group comparisons if you used them. If the number of subjects in each group was not equal, report the cell sizes. Be sure that the reader can understand one effect completely before going on to the next. If you have presented many statistics, it is helpful to the reader if you summarise the effects in words at some point.

4.5 TABLES AND FIGURES

To report the data, choose the medium that presents them clearly and economically. Tables provide exact values and can efficiently illustrate main effects. Figures of professional quality attract the reader's eye and best illustrate interactions and general comparisons, but they are not quite as precise as tables. Figures are more expensive than tables to reproduce, and both formats are more expensive than text to compose, so reserve them for your most important data. (Discussing the implications of the results is not appropriate here.)

Summarising the results and the analysis in tables or figures instead of text may be helpful; for example, a table may enhance the readability of complex sets of analysis of variance results. Avoid repeating the same data in several places and using tables for data that can be easily presented in a few sentences in the text.

When you use tables or figures, be certain to mention all of them in the text, Refer to all tables as tables and to all graphs, pictures, or drawings as figures. Tables and figures supplement the text; they cannot do the entire job of communication. Always tell the reader what to look for in tables and figures, and provide sufficient explanation to make them readily intelligible.

Sometimes results can be summarised most easily through figures or tables, but these should be used sparingly (because they take up a lot of valuable journal space). A figure or table should enhance what you have to say about that data. Avoid reporting the same statistics or summary data in the text and in a table or graph. If your F values, means, and SDs are in a table, simply refer the reader to the table at the appropriate time—for instance, "Results of the statistical tests and group means are shown in Table 1."Never duplicate the same information in a table and a figure. Figures and tables must be referred to within the text and should be an integral part of the presentation, not ornaments dangling in space. The results section is used only to present the objective data as they appeared in the experiment. Interpretation of the results belongs in the next section.

Label all of your figures, tables and graphs (graphs should also be labeled as figures)

using a consecutive numbering scheme that starts with the first one of each to appear in the report (i.e. the first table is Table 1, the first figure or graph is Figure 1, the next table is Table 2 and so on). Then use those labels in your text. .

All of your figures and tables should have detailed, informative titles. Someone should be able to look at a table or a graph and understand it without looking at any of the text. (Have a look at how this tends to be done in journal articles).

Self Assessment Questions

1) What are the methods of writing the results in the report? Elucidate.

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2) How do we write the validation of hypothesis by the results?

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3) How do we present statistics in a report?

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4) When do we use tables and figures to represent the data?

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4.6 DISCUSSION

After presenting the results, you are in a position to evaluate and interpret their implications, especially with respect to your original hypothesis. You are free to examine, interpret, and qualify the results, as well as to draw inferences from them. Emphasise any theoretical consequences of the results and the validity of your conclusions. (When the discussion is relatively brief and straightforward, some authors prefer to combine it with the previous Results section, yielding and Discussion.)

Open the discussion with a clear statement of the support or nonsupport for your original hypothesis. Similarities and differences between your results and the work of others should clarify and confirm your conclusions. Do not, however, simply reformulate

and repeat points already made; each new statement should contribute to your position and to the reader's understanding of the problem. You may remark on certain shortcomings of the study, but do not dwell on every flaw. Negative results should be accepted as such without an undue attempt to explain them away.

Avoid polemics, triviality, and weak theoretical comparisons in your discussion. Speculation is in order only if it is (a) identified as such, (b) related closely and logically to empirical data or theory, and (c) expressed concisely, Identifying the practical and theoretical implications of your study, suggesting improvements on your research, or proposing new research may be appropriate, but keep these comments brief. In general, be guided by the following questions:

- What have I contributed here?
- How has may study helped to resolve the original problem?
- What conclusions and theoretical implications can I drawn from my study?

The responses to these questions are the core of your contribution and readers have a right to clear, unambiguous, and direct answer.

Here you shall report the results of your data analyses. However, you should not discuss, or attempt to interpret them in this section. Sometimes you will come across research reports that combine the results and discussion section.

Though you might be tempted to do this if you have a large number of results that need to be discussed, it is better to stick to the standard format.

The first part of the results should say how you calculated the scores for your participants. This will often be obvious; for example, the score might be the number of words correctly remembered. Sometimes the method of scoring will be less obvious, and sometimes it might even be quite complex.

The second part of the results should display descriptive or exploratory statistics. The third part of the results should display information about any statistical tests that you carried out.

If you have a number of hypotheses to test, you might prefer to present the descriptive statistics and the inferential statistics together for each hypothesis. Your results section would then look like:

Hypothesis A: Inferential statistics, hypothesis A: descriptive statistics.

Hypotheses B, descriptive statistics, Hypothesis B inferential statistics, etc.

It can be difficult to know what level of detail to put in the results section. If what you are putting into this section will help to answer part of your initial questions or hypotheses, then you are right to include it.

The Results section should be easy to understand on its own. Make sure that the reader does not have to keep flicking back and forward to other sections of the report to understand what you are saying. For instance, students sometimes put into the Results section abbreviations that were described in the Materials section. Don't use abbreviations that the reader may not remember.

You can report results in many different ways: using a text description, a table or a graph. For example, you could write, "Group 1 (chocolate) had a mean happiness score of 12.3, higher than group 2 (carrots) whose mean happiness score was 4.1"

You could present the same information in a table, or a graph. Generally, you should choose the method that takes up the least space – but conveys the information clearly. In this example, the text description is acceptable – anyone reading it has all of the information needed– the graph and the table give no new information, and do not enhance our understanding in any way. Choosing the method of presenting the information is, however, a complex issue.

It can be difficult to know how to report statistical tests in text. As a rule, you need to report the test statistic, either the N, or the df (depending on the test) and whether the result is significant. There are two ways of doing this, and either would be appropriate. The first way, is just to list the test statistic, the df and the probability: & choi;^{2} = 1.3, df=1, p>0.05. The second way is to put the df (or less commonly the N) in brackets after the test statistic t(88) = 2.4, p < 0.05.

If you use a statistical package, it will probably provide you with an exact p value, rather than just saying p<0.05, it will say p=0.023. Arguments rage in methodological circles about how this should be reported. One side of the argument says that you should simply report whether the result is significant at the 0.05 level, or not. So, if the statistics package says that p=0.0045, you should write p < 0.05. The other side of the argument says that you should write the exact value that is given for p, so if the statistics package says p=0.0045, you write p=0.0045. A sort of compromise is to use cut-off values of 0.05, 0.01 and 0.001. So if the statistics package says that p=0.0045, you should write p < 0.01. Whilst many journal articles still use this technique, it is usually frowned upon in methodological circles. I don't know which of these your lecturers will prefer you to use – the best thing for you to do is to find out, and use the same one.

If a statistics package says that p=0.000, it doesn't mean it. It has rounded the value to 3 decimal places, and it means that p < 0.0005.

Don't give excessive numbers of decimals. One decimal more than the accuracy of your measure is usually enough. If you measured how many digits people could recall, writing that the mean was 7.1 is fine. Writing that the mean was 7.132384 is far more accuracy than your measure warrants.

In this section, you state your conclusions on the basis of your analyses. The conclusions should be related to the questions raised in your introduction section. How is this study, and these results, relevant to the field? You should open the discussion section with a statement of support or nonsupport for your original hypothesis. You may want to point out differences or similarities between other points of view and your own. You may remark on certain shortcomings of the study, but avoid dwelling on flaws. In general, this section allows you relatively free rein to examine, interpret, and qualify your results. The overall purpose of the discussion section is to evaluate you experiment and interpret the results. As you learned in the previous chapter, the discussion should tie things together for readers. In the introduction you reviewed the literature and showed readers how you arrived at your hypothesis and predictions. In the method section, you described the details of what you did. In the results section, you presented what you need to explain what you have accomplished: How do your findings fit in with the original problem stated in the introduction? Was your hypothesis supported? How do the findings fit in with prior research in the area? Are they consistent? If not, can any discrepancies be reconciled? The discussion section is also the place to talk about what you think your results mean: What are the implications of the research? Can you generalise from the findings? Does further research suggest itself?

Begin the discussion section with a clear summary sentence or two restating your results (in words only). And explain whether the hypothesis was supported or not, for example:

The results of the current experiment supported the hypothesis that exposure to violent music videos would produce greater acceptance of violent behaviour. Subjects who watched music videos containing violence expressed significantly more positive attitudes toward violence than did subjects who watched music videos without any violence.

Then, go on the explain how your findings fit into what is already known about your topic, Explain how your findings are consistent (or inconsistent) with the most important findings from past studies that you talked about in your introduction section.

These results are consistent with the results of a number of other experiments reported in the literature. For example {citation} also showed that……In addition, [citation] found similar effects when subjects…..

In contrast, if your results are not in agreement with findings reported by other researchers try to explain why you believe you findings differed from theirs:

The present findings, however, are inconsistent with those reported by [citation].

The present study demonstrated that…….; whereas [citation] found that ….. The most likely explanation for the inconsistency is that [citation] used a different procedure for….Their procedure could have resulted in…..

Any sources of confounding or problems with the experiment that might influence the interpretation of the data need to be reported. But be reasonable; it is not necessary to mention things that are probably irrelevant. Whether or not all subjects had breakfast probably is not critical, especially if you assigned them to conditions at random. However, if half the experimental subjects walked out on the experiment before it was over because they were faint from hunger, your readers should know that, as well as how that could have affected the data.

Do not get caught up in offering excuses for why your results were not significant. Rethink both your procedures and your hypothesis if necessary. Apologies for small samples often lead to this common error; "If more subjects had been tested, the results probably would have been significant." Avoid being tempted to make something out of nonsignificant findings, even if they go in the direction you predicted. A trend in the right direction does not guarantee a significant outcome with a large sample. Very small samples are unreliable; the trend could easily reverse itself if you had a larger sample! Running the experiment with more subjects is the only way to validate your hunch.

If you believe your study suggests a new theoretical model or has practical, real-world implications, you may say so here, but be humble about it. The results of a single study are rarely earth shattering. If another study would clarify the findings, you can propose your idea for future research.

Keep in mind that when readers finish the discussion section, they should have a sense of closure. They should know where you were going and why. They should know how you got there, what you found, and where it firs in the context of what was already known about the problem.

The discussion section is where you are freed a little from the strict rules about what you should put in your practical report, and you are finally allowed to get a little

creative. Whilst this is a good thing in some ways, it also means that you have to think a lot more about what to put in this section.

The discussion section can be very difficult to write, and if you leave it to the last minute, you can find that you lack the necessary inspiration and end up with a rather poor (or even non-existent) discussion section.

The discussion falls into three sections:

- What did the study find?
- What do the findings mean?
- What are the implications?

The first section involves a description of your findings – an outline of what was found, this is a summary of the results section, putting an emphasis on answering the questions posed in the introduction. The second section should be a discussion of the possible interpretation of these data, including any flaws in the experimental design or execution that may limit the usefulness of the data.

In the third section of the discussion you should: (i) to assess the implications of your study – particularly with regard to any issues that you outlined in your introduction, and (ii) what questions has your research left unanswered, and what new questions has it suggested to you.

In this section, you elaborate upon the argument you began in your introduction. What this means is that a good discussion depends on having a good introduction. This section should include very little new material or literature.

Do not feel afraid to point out issues that have arisen in your research. No one, ever, has carried out a perfect experiment. Lecturers ask you to carry out practical work so that you learn, so don't be afraid to show that you have learnt from the experience. Sometimes students are afraid to point out possible flaws in their study because they think that lecturers will think that they carried out the research badly, and will therefore give them a lower grade. You can be reassured by two thoughts. First, if there are flaws in your study, your lecturer will notice them whether you point them out or not (they have probably read hundreds of practical reports in the past). Second, your lecturers will be happy to see that you have learned from the experience of carrying out the research.

Self Assessment Questions

1) What is the purpose of discussion chapter? What questions to ask to make the discussion chapter worthwhile?

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2) What is the standard format nfor putting up the results through statistics? Explain.

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3) What are the do's and don'ts to follow while presenting the results?

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4) How will you relate the questions raised in the introduction with the results?

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5) What is meant by sense of closure ? How will you ensure this in the report?

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6) What are the three sections into which the discussion falls?

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4.7 TABLE CHECKLIST: A BRIEF GUIDE TO MANUSCRIPT TABLES IN APA STYLE

- All tables included in a paper should be necessary for understanding the data.
- Tables should be simple, clean, and free of elaborate detail.
- Always double-check to make sure the data are correct.
- All tables should be mentioned in the text.
- Tables are included within a paper after any appendices and before any figures.
- Each table should be typed on a separate page.
- All tables are double-spaced.
- Table pages, just as every other page in a manuscript, should have the short title and page number in the upper right-hand corner.

- All table labels should be numbered consecutively (Table 1, Table 2, etc.).
- The data are listed in an orderly fashion with the decimal points falling in a straight vertical line.
- All tables include a caption which is located directly below the table label and is capitalised just as a title would be, underlined, and is not followed by a period.

4.8 FIGURE CHECKLIST: A BRIEF GUIDE TO MANUSCRIPT GRAPHS IN APA STYLE

- All figures included in a paper should be necessary for understanding the results.
- Figures should be simple, clean, and free of elaborate detail.
- Always double-check to see if data have been plotted correctly.
- All figures should be mentioned in the text (see Figure 1).
- Figures are included within a paper after any appendices and tables.
- Each figure should be typed on a separate page.
- Figure pages, just as every other page in a manuscript, should have the short title and page number in the upper right-hand corner (unless a photograph).
- All figure labels are numbered consecutively (Figure 1, Figure 2, etc.).
- The length of the vertical (Y) axis should be approximately 2/3 the length of the horizontal (X) axis.
- The dependent variable is plotted on the Y-axis, and the independent variable is plotted on the X-axis.
- Clearly label each axis with respect to what was measured, quantity measured, and units in which the quality was measured.
- Choose the appropriate scale units (length of intervals) so that the figure will not distort actual data points.
- Make sure that the scale points on each axis have equal intervals.
- All figures are followed by a caption, which is written below each figure and ended with a period.
- Figure labels beginning each caption are underlined and followed by a period. For example: *Figure 6.* Reaction time in seconds as a function of the intensity of the stimulus.
- Completed figures as they should appear in a written manuscript can be seen in the publication manual itself.

General Guidelines of Results and Discussion

1) Do not purposely start a new page for this section. Simply center the word results and continue typing on the very next double-spaced line (i.e., do not insert any extra blank lines here).

2) Look carefully at the results. That is, take a good hard look at all those numbers you collect. Think of different ways to summarise them (describe), as well as to make sense of them (analyse). You might find my Psychological Statistics Site helpful. This section will be easier to write if you make any tables and/or figures you intend to use first.

3) Briefly state the main findings in words. That is, first give a general description, then go into the details.

4) When presenting the results of statistical tests, give descriptive statistics before the corresponding inferential statistics. In other words, give means and/or percentages (perhaps referring to a table or figure), before talking about the results of any statistical tests you performed.

5) When presenting means, it is reasonable to use one additional digit of accuracy than what is contained in the raw data. In other words, if the raw data consisted of whole numbers, then the means should contain one decimal place.

6) When presenting nominal or ordinal data, give the percents rather than frequencies (since percents are independent of the sample size).

7) The general format for presenting an inferential statistic is: *Statistic*(df) = value, *probability* = value. Note that exact p values are preferred. Also, if the computer output says the probability is .0000, then report it as .001.

8) When possible, include some statistical estimate of effect size.

9) When actually presenting the results, try to emphasise the meaning of the statistics. That is, clearly describe what it is you are testing and what significance means for the variables involved.

10) See some examples of the correct way to present the results of several common statistical tests.

11) Do not discuss the implications of the results in this section.

12) Do not talk about the meaning of the alpha level or the null hypothesis, and what chance factors have to do with it. Since you are writing for the scientific community, you can assume the reader will have a working knowledge of statistics.

13) If you are presenting a lot of material here, you may wish to employ subheadings (as is done in the methods section). These subheadings should have meaning and relevance to the data and should help to organise your presentation of it. In other words, they should not be organised by the type of analysis employed. Since this is not expected by the reader, it is a good idea to precede the subheadings with a paragraph informing the reader of the logical organisation of this section.

14) In cases where the reader would expect something to be significant and it is not, you should address the issue.

15) Do not provide raw data unless, for some reason, you require a single subject approach. whether you point them out or not (they have probably read hundreds of practical reports in the past). Second, you lecturers will be happy to see that you have learned from the experience of carrying out the research.

16) Do not purposely start a new page for this section. Simply center the word Discussion and continue typing on the very next double-spaced line (i.e., do not insert any extra blank lines here).

17) The purpose of this section is to evaluate and interpret the results, especially with respect to the original research question.

18) Start off with a brief, non-technical summary of the results. In other words, tell the reader about the main findings without using statistical terminology.

19) Then go on to discuss the implications of the results. In other words, whatever was found needs to be discussed.

20) It is also important to discuss how the results relate to the literature you cited in the introduction. In other words, emphasise any theoretical consequences of the results.

21) You might (or might not) also mention any limitations of the study and any suggestions for future research in this section.

22) Finally, you need an ending paragraph in which you make a final summary statement of the conclusions you have drawn. You are also encouraged, when appropriate, to comment on the importance and relevance of your findings. How are your findings related to the big picture?

Thus, this section should contain an absolute minimum of three paragraphs: the non-technical summary, discussion of the results and their implications, and the concluding paragraph.

Be careful with the word "prove". Since statistical tests are based on probability and can be in error, they do not really prove anything.

You can only use wording that implies causality if you actually manipulated the independent variable (i.e., performed an experiment). For example, suppose you manipulated whether subjects received a drug (while employing appropriate control procedures, etc.) and found a significant difference in memory performance (with the drug users performing more poorly than nonusers). In this case, you would be able to conclude that the drug caused the difference in memory ability; it impaired it. As another example, suppose that you compared drug use (as determined from the results of a survey) with memory ability and found a correlation (greater use went along with poorer memory performance). Since correlation doesn't say much about causality, we could only conclude that there is a relationship between drug use and memory ability.

4.9 LET US SUM UP

This section of the main body is the results whose purpose is to provide sufficient information about how the conclusion was reached. The heart of this section is the presentation of data relevant to test the hypotheses. All relevant data are presented including those that don't support the hypotheses. Tables and figures are commonly employed for supplementing textual material. A table consists of several numbers that summarise the major findings of the experiment. A figure is a graph, photograph, chart of like materials, which are relevant particularly for certain kinds of data like showing the progress of learning or maturation over a designated period. Data in the text and in tables or figures should not be redundant, rather, they should be

complementary. Results of the statistical analyses carried should be provided. However, they should not be interpreted and discussed in this section.

The final section of the main body report is discussion. The major function of this section is to interpret the results of the study and to relate those results to other studies. The implications of the study including the hypotheses, supported or not supported, are discussed. If the findings are contrary to the hypotheses, some new explanation is required so that a new hypothesis may be advanced. New hypotheses may also be advanced about any uncommon deviation in the results. Sometimes faulty hypotheses can be modified to make them consistent with the results obtained. Negative results should also be discussed. Such results occur when a hypothesis predicts something but the results don't support that prediction. A brief speculation about why they occurred, is sufficient. A brief discussion of the limitations of the present study and proposals for future research is appropriately discussed here. Here the researcher finally includes conclusions that reflect whether the original problem is better resolved as a result of the investigation.

4.10 UNIT END QUESTIONS

1) What is the significance of Results in Research Report writing?

2) Discuss the relevance of Discussion and Analysis of Results in Research Report What are the strict APA guidelines for writing Discussion and Analysis of Results?

3) Carve out a befitting Research Report Results and Discuss with the help of an example.

4.11 SUGGESTED READINGS

Publication Manual of the American Psychological Association (Sixth Edition, 2009). American Psychological Association. Washington, DC.

Singh, AK. (2009). *Test Measurements and Research Methods in Behavioural Sciences* (Fifth Edition). Bharti Bhawan Publishers & Distributors.

UNIT 5 SUMMARY AND CONCLUSION

Structure

5.0 Introduction

5.1 Objectives

5.2 Summary, Definition and Description

5.3 Guidelines for Writing a Summary

5.4 Summarising

5.5 Writing the Summary and Choosing Words

5.6 A Process for Paraphrasing and Summarising

5.7 Summary of a Report

5.8 Writing Conclusions

5.9 Strategies for Writing Effective Conclusion

5.10 Important Points for Writing Conclusion

5.11 Strategies to Avoid Ineffective Conclusions

5.12 Let Us Sum Up

5.13 Unit End Questions

5.14 Suggested Readings

5.0 INTRODUCTION

The summary and conclusion is a chapter which is the last of all the chapters in a research report. It is almost equivalent to an abstract but more elaborate than an abstract. In this unit we will focus on how to write the summary and conclusion of a research report. We have already presented how we went ahead with the research and what have been our findings etc. Now is the time to indicate to the reader what exactly was done and what have been the result in a succinct and summary format. It must be remembered that when a person reads the summary and conclusion of a report he or she should get an almost comprehensive idea of what the research had been all about. In order to do this a high degree of skill is required to write this chapter making sure that everything is well summarised and at the same time nothing has been left out.

5.1 OBJECTIVES

After reading this unit, you will be able to:

- explain what is the Summary and Conclusion component in a Research Report.
- describe how to write Summary and Conclusion in a scientific manner in a Research Report.
- learn the art of writing Abstract as substitute of Summary and Conclusion as per APA format.
- explain where the sub-section Summary and Conclusion is incorporated as per APA format.

According to the Publication Manual of American Psychological Association (APA, 4th, 5th, 6th, edition) Report Writing in APA format has no provision for writing the heading 'Summary and Conclusions'. Instead, the trend is to substitute Summary of Conclusion with 'Abstract'.

An Abstract is a brief, comprehensive survey of the contents of the article. A well prepared Abstract not only needs to be dense with information but also readable, brief and self-contained. A good Abstract should be accurate, concise, specific, non-evaluative and coherent and reliable.

An Abstract of a report of an empirical study should describe in 100 to 120 words the problem methodology, apparatus, data collecting procedures, tests, findings, significance level and Conclusions and implication and application. An Abstract for a review or theoretical article describes in 75 to 100 words comprising topic, purpose, thesis and scope along with sources and Conclusions.

5.2 SUMMARY, DEFINITION AND DESCRIPTION

A summary, synopsis, or recap is a shorter version of the original. Such a simplification highlights the major points from the much longer subject, such as a text, speech, film, or event. The purpose is to help the audience get the gist in a short period of time.

All of you would have done the exercise of summarising what you have read in your school and college. We do this almost in all writing assignments that we get in school. The teacher gives us a novel and asks us to read it and come back tomorrow and present a summary of that novel. While doing so, we try not to lose the main theme of the novel, highlight the important events and then present the entire thing with a beginning, a middle and an end of the novel. We may or may not give much of a description of the characters in the novel except the hero, the villain and any other important member. We all have seen and heard people telling a story, some make the same story absorbing while others may make the story too prosaic and a few more may make the story sound totally boring. Thus summarising anything is a skill and it is important though, to recognise when you must go beyond describing, explaining, and restating texts and offer a more complex analysis. In academic writing summarising is very important which requires considerable skill about which we will in the following sections.

5.3 GUIDELINES FOR WRITING A SUMMARY

First of all the one most important things to keep in mind is the audience to whom the summary is made. Is this person a common man, layman, professional, media personnel, children etc. As we write the summary we must keep in mind first of all the audience, the person who is going to read the summary. Second important thing is to keep in mind the assignment itself. Here it is the report which is to be summarised. Whether it requires an argument or a statement of the problem or does it require supporting evidence etc. Summary can be used to provide the background to the topic, set the stage and illustrate the evidence that is supporting the main theme. But all these should be very brief and not at all too elaborate lest the summary becomes a full fledged writing of an essay arguing back and forth. A few sentences should focus on your argument.

Now let us see what is an argument. In academic writing, an argument is usually a main idea, often called a "claim" or "thesis statement," backed up with evidence that supports the idea. Argument is something like a claim, in which you state, for instance

that children taught by audio visual method will be able to show greater innovativeness in their writing than those who do not get taught by audio visual method. Such claims require supporting evidence which have to be provided.

1) An important step in the process of writing effective arguments is understanding the concept of argumentation. If your writing does not have a main point, it cannot be arguing for anything. Hence ask yourself this question as to what is your point and then put forward in your mind the evidence to support that argument. This would help in focusing on what you want to argue. Thus the summary that you are writing may focus ton the topic of argument and then give supporting evidence or you may merely state the main issue relating to the research that you had conducted.

2) Another important thing is pre-writing. You may also want to try some pre-writing activities that can help you develop your own analysis. Pre writing involves outlining, freewriting, and mapping. That is whatever you want to state in the report make an outline of it by stating the main points which can be later elaborated. Write all that comes in your mind that is free writing and later on edit it so that all points that you want to cover get covered in the summary. Pre writing also involves mapping that is, make a map of what points to be covered and in what order and which should come first , which second and which last. Such mapping helps in writing the report comprehensively without missing any point.

3) Another point to remember is the focusing on the main plot. After all, the plot is usually the easiest part of a work to understand. If there is no plot as such and you are not able to understand you can repeat what you had earlier stated as the main theme or the title.

4) Another point to keep in mind is to focus on the elements that are relevant to your report. If possible, carefully consider your report, what had gone into it, chapter by chapter and understand the basic issues.

Self Assessment Questions

1) Define and describe what is summary.

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2) What are the important things to keep in mind while writing a summary.

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3) What is menat by pre writing. What are its advantages?

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4) What is meant by argument? Give a few examples of how to argue a point in a tresearch report.

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5.4 SUMMARISING

How to know that we are summarising. The questions that should be put to yourself while summarising are the following:

1) Is what I am stating is obvious to the readers?

2) Does the summary cover the main plot, the main argument and other important events in chronological order which has been used in the report?

3) Is that my summarising is merely describing something of what, where and whom?

These three questions if kept in mind and answered every now and then as we proceed to write the report will be of great value. The answer to these questions if is 'yes' it indicates you are in the right direction.

Explaining of the why or how aspect of the text is important. It is generally worthwhile to have the entire text in the mind , look at it from a holistic point of view and then start summarising.

Avoid the following phrases while writing the summary:

This report is about ….

The report is the realistic picture of ..

This author writes about the report..

Avoid unnecessary wordings and descriptions. Be strictly precise and use words economically. Give in the sentence importance to the main plot. Always try to relate the summary to the main plot and do not lose sight of the plot.

Take the following steps in order to analyse a text:

- Look for evidence that supports the main point or theme .
- Also look for things that contradict it.
- Find out if the writing and the pictures or figures given are well related and linked.
- Find out if the visuals that you have given in the report will catch the attention of the reader.

- Find out the assumptions underlying your main theme

What strategies to follow to avoid excessive summary?

- Read and re read the report.
- Go back to the main report everytime as you are summarising
- Identify the main plot, history, the background, assumptions, theory etc.
- While wrtring the summary, critically analyse what the report contained. The questions and doubts that come to your ind as you are sumamrising.
- Find out which parts of the report you agree with and with which you do not agree.
- Find out also if this work reminds of any other work you have read earlier.
- Whatever your report states , is the main theme comes out clear in the report and in the summary that you are writing?
- Do you want the statement or the main plot to be the focus and come out strong in the summary
- Ask yourself the question as to which part of the report will be of use to the reader and which part of the report can be deleted or not include in the summary

If you are able to keep the above in mind and start writing the summary your focus and your writing will be precise, concise and would throw light on the main issue which you want to communicate to the reader.

Self Assessment Questions

1) How do we know we are summarisign?

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2) What strategies do we follow while writing a summary?

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3) What is meant by excessive summarising? What strategies to follow to avoid excessive sumamrising?

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5.5 WRITING THE SUMMARY AND CHOOSING WORDS

Writing is a series of choices. As you start writing the summary of the report, you choose your topic, your approach, your sources, etc. When you are ready to write, you must be careful to choose the right words to use and express varied things in your summary. These words chosen by you must have to be arranged in sentences or paragraphs so that the right expression and appropriate words are used to convey the correct meaning. Never be satisfied with one time writing. Whatever is written read through it many times and every time you read you will find there is scope for improvement. As you read and re read the draft that you have written, ask yourself the question if this is what you really wanted to convey or is there something else or the same thing needs to be conveyed in a different manner. Another important question to ask yourself is that will readers understand what you have written. Is this what you really meant etc.

Finding words that capture your meaning and convey that meaning to your readers is challenging. When you use any word make sure it is not awkward, vague or just wordy. Each word must convey the correct meaning.

Sometimes a sentence is hard to follow because there is a grammatical problem with it or because of the way the words and phrases are put together. Here's an example: "Having finished with the studying, the movie was immediately seen." This is a bad sentence. If the comma is not there, it would appear as if the person was studying the movie. The best way to write the sentence is "Having finished with studying, the students moved on to see the movie immediately." Sometimes, the problem with clarity is the word that has been chosen. Given below are some words which are examples of wrongly chosen words.

Misused words: The word chosen does not reflect what the author wanted to mean. E.g. The chi square was used to convey the *differences*.

The right sentence is "chi square was used to convey the association between the variables.

Words with unwanted connotations or meanings. The word chosen has a meaning attached to it which is unwarranted and the author actually does not mean it. For example: The questionnaire was administered to participants in their private places. The right sentence would be "The questionnaire was administered to participants in privacy."

Using a pronoun when readers can't tell whom/what it refers to: The word chosen is meant to indicate one and not the other but when the reader reads it the sentence will be confusing. For example: "He collected the information through interview with the priest but he did not like it." Here the he in "he did not like it" refers to the priest and not to the investigator. So the right sentence is "He collected the information through interview with the priest but the latter did not like it."

Jargon or technical terms: Don't use jargons and technical words when a summary is meant for a layman who has no idea about these jargons or words. Even if it is meant for professionals such words and jargons should be used only if it is essential. To give an example: Polygraph helps to identify friminals." Polygraph is a term that many may not know. Hence the best way to write this sentence would be "The method or instrument used to identify the criminal is known as polygraph."

Loaded language. Sometimes we write some things which causes confusion to readers because the meaning becomes different from it was meant to be. For example: Exercising in gym is important for girls and boys for their health but societal attitude to be changed for this." The right sentence is " While it is important for girls and boys to work out in gyms, that has become a fad these days causing harm to children, hence attitudinal change in society is required towards the kind of health one wants the youngsters to develop."

Wordiness

Sometimes the problem isn't choosing exactly the right word to express an idea. It is being "wordy," or using words that your reader may regard as "extra" or inefficient. Take Keep an eye out for wordy constructions in your writing and see if you can replace them with more concise words or phrases. To give a few examples, Instead of saying "In all cases" , you can use *"Always";* Instead of saying "Regardless of the fact that " you can use *"Although*". Instead of stating that "At that point in time" you can state *"Then*" It is important to avoid such long words and pick one which is the most suitable. Yiou can use the thesaurus for this and pick the right word.

In contrast to quoting directly, by summarising or paraphrasing an author's ideas you are able to present your interpretation of an author's ideas and to integrate them more fully into the structure of your writing.

Self Assessment Questions

1) How do we choose words to write a summary?

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2) What is meant by selecting the right words to write a summary?

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3) What words should be avoided in writing the summary?

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5.6 A PROCESS FOR PARAPHRASING AND SUMMARISING

Paraphrasing is useful when dealing with facts and definitions. Here we generally refer to sentences or phrases in the source text. It is particularly useful when you

want to rewrite a short section from the text and you can do that using different words and language but keeping the meaning in tact. Summarising on the other hand is generally used when there needs to refer to ideas contained in a long text. Summarising enables the researcher to reduce the author's ideas to key points in an outline of the discussion or argument. It helps omit unnecessary details and examples. Whether one summarises or paraphrases, there is still a need to include a reference citing the source of the ideas the researcher has referred to.

Many students find the following process useful for summarising and paraphrasing information:

1) Read the text carefully - you may need to read the text several times, and check the meaning of terms you do not understand in a dictionary.

2) Identify and underline the key words and main ideas in the text, and write these ideas down.

3) Consider these points as a whole and your purpose for using this information in relation to the structure of your assignment. You may be able to group the ideas under your own headings, and arrange them in a different sequence to the original text.

4) Think about the attitude of the author, i.e. critical, supportive, certain, uncertain. Think about appropriate reporting verbs you could use to describe this attitude.

5) Think of words or phrases which mean roughly the same as those in the original text. Remember, if the key words are specialised vocabulary for the subject, they do not need to be changed. (see Using synonyms below.)

6) Using your notes from the above steps, draft your summary or paraphrase.

7) When you have finished your draft reread the original text and compare it to your paraphrase or summary. You can then check that you have retained the meaning and attitude of the original text.

Techniques for paraphrasing a text

1) Use synonyms that is synonymous words

2) Use synonymous forms

3) Use synonymous phrases

To cite an example, if a person has written in the report a paragraph indicating the various instruments used in collecting the data, the person can state the same thing using different words but keeping the meaning of the words as they are.

Self Assessment Questions

1) How do we differentiate between paraphrasing and summarising?

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2) What strategies should we use while paraphrasing?

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3) What is the process involved in summarising and paraphrasing?

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5.7 SUMMARY OF A REPORT

A well-prepared report can be the most important chapter in your report. Generally a reader will turn to this chapter to find out what this whole project is all about and will try to either read the entire report or leave reading depending upon how far the summary of the chapter attracted him. If it is written interestingly drawing the attention of the reader to certain important aspects of the report, then definitely the reader will be drawn towards reading the other chapters or else he may just leave the whole report alone.

The summary has to have the following: (i) Accuracy (ii) Self-contained (iii) Concise and Specific

i) **Accuracy**: The summary written ahs to be highly accurate. It shoulect the report and its main theme unambiguously. No information that is not contained in the report should figure in the summary. Nothin additional should be posted in summary except the exact information that hasn been a part of the main report. In summary you may mention the author of a certain point mentioned in the text but tthis should be more an exception than the rule.

ii) **Self-contained**: The summary should be self contained in that one need not go looking for any references ormaterials while reading the summary. It must contain all the information , including the units of measurement, analysis of the data, the statistics used etc. Just by reading the summary the reader must come to know what exactly has been done in the research and what more needs to be done.

iii) **Concise and Specific**: Each sentence in the summary should be maximally informative, though one should aim for brevity. The summary should be small and should not be long that it takes time to read it . It should be written in such a manner that all the important information should be available and no unnecessary information is presented which wastes space and words. (iv) Be as brief as possible. You can write thee main findings in chronological order serial numbering them and which actually is the main purpose of summary. The reader must know what conclusions have been arrived at and how and if this information is put in chronological order with numbering, it would facilitate comprehension and remove unnecessary complexities.

iv) Use digits for all numbers, except those that begin a sentence (consider recasting a sentence that begins with a number).

While writing the summary you can use abbreviations such as 'for example' you can say 'for e.g.' And for 'versus', you can say 'vs'. etc. But these abbreviations must also be explained elsewhere either at the end or in the beginning of the summary. While writing summary always use active voice and don't use I and we. It should be in the third person basically.

v) Make your summary non evaluative. Never give your opinion or arguments while writing the summary. It should just state the facts and not give any arguments. Just report your findings and exactly what transpired and keep your arguments strictly to the discussion section.

vi) The summary must be readable, cogent and continuous. There must be a continuity between one paragraph and the other and one sentence and the other and one section and the other. Always relate the various issues that are being put forward in the summary so that the reader gets a coherent picture of what had gone on in research and what conclusions have been arrived at.

There is no limit as such to the number of words used in the summary. It depends on what has the researcher done, what has been presented in the report and how the problem under investigation has been handled and what are the final outcome.

vii) It would be ideal to present the experimental method, if has been used in the research study. The design of the study should be briefly reported without any elaboration, indicating the manipulation of the independent variable , the instruments used to bgather the data and the validity and reliability coefficient of the tests if had been used in the research\h. These must be brief and hardly should take space more than a sentence.

The summary should contain the findings including statistical significance levels.

- It would be ideal also to indicate some of the limitations in the study in terms of methodology or selection of sample or selection of instruments etc.
- Such mentioning of the limitation helps in avoiding then many pitfalls in the research when another one is undertaken.
- A summary that is accurate, succinct, quickly comprehensible, and informative will increase the interest of the readers and they will then like to read the full report.

Self Assessment Questions

1) Enumerate the various things to be kept in mind while writing a report.

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2) How would you write a summary in which you would also indicate the statistical findings?

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3) What rules do we follow while writing abbreviations and numbering in the summary?

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5.8 WRITING CONCLUSIONS

Conclusions can be the most difficult part of reports to write. While the body is often easier to write, it needs a frame around it. An introduction and Conclusion frame the ressearcher's thoughts and bridge ideas for the reader. Just as the introduction acts as a bridge that transports readers from their own lives into the "place" of the research report analysis, the Conclusions too can provide a bridge to help readers make the transition back to their daily lives.

Such a Conclusion will help them see why all the analysis and information should matter to them after they put the report down.

The Conclusion is the chance one has to have the last word on the subject.

The Conclusion allows the researcher to have the final say on the issues that have been raised in the report, to summarise the issues pertaining to the research topic, one's own thoughts on the subject, how to show the significance of the topic to the readers, and give them a new idea to mull over in the coming years for research purposes. It is also an your opportunity for the researcher to make a good final impression and to end on a positive note.

The researcher's Conclusion can go beyond the confines of the research report.

The Conclusion can definitely go beyond the boundaries of the topic and allows the researcher to consider broader issues, make new connections, and elaborate on the significance of the research findings.

The Conclusion should make the readers glad they read the research report, as they get new perspective on the topic and kindles their enthusiasm and motivation to try out new ideas and inn ovation in research

The Conclusion gives the reader the benefit of obtaining some extra inputs to try out in their next research project or even mayconsider replicating gthe present research.

The broader implications suggested in the summary would provide the reader considerable enhancement of knowledge in regard to that topic as well as related topics.

5.9 STRATEGIES FOR WRITING AN EFFECTIVE CONCLUSION

It would be ideal to follow some of the strategies mentioned below in writing the conclusion:

1) The researcher should not accept all the findings as is where is but question its veracity. Keep every finding and keep stating "So What". If Researcher gets stuck and feel that the conclusion that has been arrived at does not say anything new or novel, then the researcher may ask one of the readers or a friend to read conclusions.

2) Whenever a statement is read out from the conclusion, ask the friend to say, "So what?" or "Why should anybody care?" Then ponder that question and answer it. Here's how it might go (Refer to the box below)

Researcher: *Basically, I have found out that teaching methodology is important for enhancing academic performance in children*

Friend: *So what?*

You: *Well, it is important because by demonstrating that teaching methodology makes a difference in the academic performance of children, one could convey to the teacher training institutes to include the teaching methodology that they can teach the trainees which the latter can later on transfer to their class room situation.*

Friend: *Why should anybody care?*

Researcher: *Teachers do care because the schools expect better performance from children and the school's reputation depends also on the student performance. If due to methodology the children can do better in academics, it should be a great contribution*.

The above is an example of how to make a friend say "so what" and then try to find answers which help to clarify the researcher's thinking and make the researcher understand the problem in greater depth. The researcher too on his or her own try this out by questioning self as to "so what" and find answers to the questions.

Another important aspect regarding writing of conclusion is that one should always return to the theme or themes in the introduction. This strategy brings the reader one full circle. For example, if the researcher begins by stating of objectives of the research project, he or she can end with the same objectives as to whether the purpose with which he started his work has been achieved. The researcher may also use the key words he had used in the introduction and end up with those words orf parallel concepts and conclude the writing.

Remember that in writing conclusion one should not summarise but only synthesise the various findings that have emerged in the research study. For this the researcher could include a brief Summary of the report's main points, but should not however repeat things that are in the report. Instead, the researcher should show the reader how the points that were made and the support and examples that the researcher used fit together. All these should be put together to make the reader understand the intricacies of the issue.

Further more, conclusion should always indicate proposed course of action, a solution

to an issue, or questions for further study. Through this the researcher can redirect the readers thought processes and make the person contemplate on what all findings have emerged and the many new ideas the report was able to stimulate in the reader.

Conclusions must always point out the broader implications. For example, if the report has demonstrated that teaching methodology does enhance the academic performance of children, the researcher could point out its impact in the school set ups as well as in teacher training programmes.

Writing a strong Conclusion is an important skill that many researchers lack. They need to summarise the main points concisely, avoid repetition, avoid the introduction of new information, and use brief and succinct, simple language.

It is important to end the report with an effective concluding statement. Remember, a Conclusion is like a goodbye at the end of a meeting, as this is the last chance one has to convince the reader that he or she should take the research work seriously.

Writing an effective and well-written Conclusion is a skill and to do this there are certain important points:

Self Assessment Questions

1) What is meant by conclusions? How is conclusion important for a research report?

   .....

   .....

   .....

2) What are the strategies to follow in writing conclusions?What is an effective conclusion?

   .....

   .....

   .....

3) What all must be avoided in writing conclusion?

   .....

   .....

   .....

5.10 IMPORTANT POINTS FOR WRITING CONCLUSION

It must be noted that there are certain points to be kept in mind while writing the conclusions to a research report. These are given below:

- *Summarise the Main Points*

The Conclusion needs to *summarise* the main points of the report. To summarise means to restate the main ideas in a manner that is as concise as possible.

Typically, the Summary part of the Conclusion includes a brief sentence that sums up

the main points in a very simple way. It then gives a more detailed account of the main points.

In a short report, the main points can all be summarised in one sentence, and in a longer report, each point can have its own sentence.

- *Avoid Repetition*

It must be remembered that in writing conclusion, the researcher must not include too much detail, and summarise the most important information in the main points.

Another thing to avoid is to cut and paste passages from earlier in the report into the Conclusion. This should be totally avoided.

- *Avoid New Information*

The researcher should avoid give any new information to the reader at this point, especially if this new information is not incorporated in the main report. This point is to be kept in mind even if the researcher considers that the new information is important.

- *Use Signpost Words*

Signposts are words that the researcher uses to help the reader follow along. These include words like "first," "second," "next," "finally," and "in Conclusion." The ending of a report is an important context to use signpost language because the reader needs cues that the report is about to end.

- *Concluding Statements*

Reports should end with a statement that mentally brings the reader to a stop. This statement should be relatively short; three sentences is a good limit. As pointed out in the APA , the concluding statements might include:

- a brief anecdote
- an appropriate quotation
- a humorous or witty statement
- an interesting metaphor or simile
- re-emphasising why this is an important topic
- a brief statement about the need for future research

The researcher should do the following in order to write a proper summary and conclusion:

S.No	What should be done
1.	What was learned from this study, what did the research in fact indicate
2.	What remains to be learned , that is directions for future research
3.	What have been the limitations in the study.
4.	What benefits, new findings, new information and application based findings have emerged in the study

Always the researcher should remember the many problems that may come about in writing the conclusion. These are listed below:

S.No	To avoid
1.	Writing long conclusions to be avoided. Conclusion must always be short and should not become another thesis.
2.	Do not give too much detail. Do not repeat the main report at the conclusion also. Avoid long and unnecessary detail. Do not mention in detail the methodology or the results as this is not the place for it. Mention the methodology very briefly highlighting the main aspects and give your conclusions in points.
3.	Remember that the conclusion has to highlight the implications, evaluations etc and not on the details of the methodology which if the reader wants he can always go back to the method chapter to recapitualate.
4.	Always remember to think and rethink about the significant and larger findings that have emerged and which need to be highlighted. By doing so you will not miss out the main findings and significance of the research in the conclusion.
5.	In the conclusion chapter your focus should be the general issues, that is how your research will affect the world. Your conclusion thus will put your research in context.
6.	While giving all the findings, never ignore the limitations and the negative points of the research. It is equally important. The problems faced, the drawbacks in the research should all be mentioned as part of qualifying your conclusions itself.
7.	It is important to remember that the researcher should put forth in the summary what has been learned from the study. How the research is linked to the field or to the discipline to which the researcher belongs. For this a brief summary would do.
8.	Always match the objectives of the research with your conclusion. Sometimes the research objective may change while the research is being carried out. All that needs to be done is that within the broad framework, the changed objectives could be stated in the introduction by going back to it.

5.11 STRATEGIES TO AVOID INEFFECTIVE CONCLUSIONS

- Do not begin with unnecessary, overused phrase as for e.g. ‘in summary’ or ‘in conclusion’ etc.
- Do not state the topic for the very first time in the conclusion.
- Do not introduce a new idea or subtopic in your conclusion.
- Never end the conclusion with the topic rephrased without any substantive changes.

- Do not make any sentimental or emotional appeal that is out of character with the main research report.
- Never include any quotations, references and statistics in the conclusion. These should be only in the body of the report.

Self Assessment Questions

1) What are the important points to keep in mind while writing the conclusions?

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2) What are the dos and don't's in writing the conclusions?

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3) What should be avoided in writing conclusions?

.....

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.....

.....

5.12 LET US SUM UP

Summary and Conclusion of a research report seem to be one of the most difficult part in the work. The writer does not have anything left to say to his reader. Moreover, he is at a loss why on earth he should repeat everything again. The thing is that research reports Conclusion is not a mere repetition of the information presented, it's a general outline, a brief overview of the most important points of the field studied. If you think that the Conclusion of a research report is of no particular importance, please, consider the following functions a strong Conclusion fulfills. it stresses the importance of the thesis statement, gives your work a sense of completeness impresses much your reader. Conclusion echoes your introduction restates your researchtopic or thesis statement. Note that the conclusion much depends on what precedes it, it is a constituent part of the whole report without which it looks unfinished. Conclusion of a research report should be the best part of it.

5.13 UNIT END QUESTIONS

1) Discuss some of the important considerations to be kept in view while writing Summary and Conclusion in a Research Report.

2) Carve out a befitting Research Report Summary and Conclusions with the help of an example.

5.14 SUGGESTED READINGS

Publication Manual of the American Psychological Association (Sixth Edition, 2009). American Psychological Association. Washington, DC.

Singh, AK. (2009). *Test Measurements and Research Methods in Behavioural Sciences* (Fifth Edition). Bharti Bhawan Publishers & Distributors.

UNIT 6 REFERENCES IN RESEARCH REPORT

Structure

6.0 Introduction

6.1 Objectives

6.2 Reference List (the Format)

6.3 References (Process of Writing)

6.4 Reference List and Print Sources

6.5 Electronic Sources

6.6 Book on CD, Tape and Movie

6.7 Reference Specifications

6.8 Abstract from Secondary Data Base

6.9 Footnotes

6.10 General Guidelines to Write References

6.11 Let Us Sum Up

6.12 Unit End Questions

6.13 Suggested Readings

6.0 INTRODUCTION

The reference section is a very important component of the report. It contains all the necessary literature that have been referred to before, during and after the study and contains books, journal articles and documents from where the materials have been referred to. References differ from bibliography in that references are those literature which have been cited in the main text of the report in different places. Bibliography includes many referred as well as many unreferred literature in the text of the report. Sometimes a book would have been consulted but not necessarily referred to in the text. Thus the bibliography will be inclusive of many materials which have not been referred in the text. Of course it may contain the referred materials also. On the other hand the references will contain basically the referred materials. In this unit we are going to focus on references , how to write the same and the importance of reference etc. Basically we will be depending on the APA source for this purpose.

6.1 OBJECTIVES

After reading this unit, you will be able to:

- explain how to write References in a scientific Research Report as per APA;
- describe the art of Referencing; and
- write a Research Report References in APA format.

6.2 A REFERENCE LIST (THE FORMAT)

As per Publication Manual of American Psychological Association (Sixth Edition, 2009) just as data in the paper support interpretations and conclusions, so Reference citations support document statements made about the literature.

All citations in the manuscript must appear in the Reference list, and all References must be cited in the text.

The Reference list should be succinct, not exhaustive; simply provide sufficient references to support your Research. Choose References judiciously and cite them accurately. For example, if you retrieve an abstract but do not also retrieve and read the full article, your Reference should be identified as an abstract.

The standard procedures for citation ensure that References are accurate, complete, and useful to investigators and readers.

Whenever possible, support your statements by citing empirical work, such as method and results of an empirical study or a review of empirical studies (Lalumiere, 1993). When you cite nonempirical work, make this clear in your narrative as given in the examples below (see the box)

Tripathi (1991) theorized that
Pandey (in press) argued that
Parmeshwar (1993).

Similarly, when you want to direct the reader to background information, signal the reader with phrases such as "for a review, see" and "(e.g., see [author, year]).

"References" section begins at a new page with the label "References" at the centre. References comprise all documents including journals, books, technical Reports, computer programmers and unpublished works mentioned in the text of the Report.

References are arranged in alphabetical order by the last name of the author(s) and the year of publication in parenthesis or in case of unpublished citations, only the Reference is cited.

Sometimes no author is listed and then, in that condition the first word of the title or sponsoring organisation is used to begin the entry. When more than one name is cited within parenthesis, the References are separated by semicolons.

In parenthesis page number is given only for direct quotations. The Researcher should check carefully that all References cited in the text appear in.

6.3 REFERENCES (PROCESS OF WRITING)

References should not be confused with Bibliography. A bibliography contains everything that is included in the Reference section plus other publications which are useful but were not cited in text or manuscript. Bibliography is not generally included in Research Reports. Only References are usually included.

References in APA Format

The APA style guide prescribes that the Reference section, Bibliographies and other lists of names should be accumulated by surname first, and mandatory inclusion of surname prefixes. For example, "Martin de Rijke" should be sorted as "De Rijke, M" and "Saif Al Falssi" should be sorted as "Al-Falasi, S." (The preference for

Arabic names now is to hyphenate the prefix so that it remains with the surname.).

Reference citations in text are done using parenthetical referencing. Most usually, this involves putting the author's surname and the date of publication within parentheses, separated by a comma, generally placed immediately after the Reference or at the end of the sentence in which the Reference is made.

However, it is also common for the authors to be the subject or object of a sentence. In such a case only the year is in parentheses. In all cases of citation, author name(s) are always followed immediately by the year in which the article was published. In the case of a quotation, the page number is also included in the citation.

Full bibliographic information is then provided in a Reference section at the end of the article. APA style defines that the Reference section may only include articles that are cited within the body of an article. This is the distinction between a document having a Reference section and a Bibliography, which may incorporate sources read by the authors as background but not referred to or included in the body of a document.

Let us now see how to write references if it is single author, multiple author etc.

- *Single author*

Format should be Author's last name followed directly by a comma, then the year of publication. When one makes the Reference to the author(s) directly as a part of the narrative, then only the year (and page number if needed) would remain enclosed within parentheses. The same holds for multiple authors.

Examples are given below:

"A recent study found a possible genetic cause of alcoholism (Pauling, 2005)."

"Pauling (2005) discovered a possible genetic cause of alcoholism."

- *Two authors*

Authors should be presented in order that they appear in the published article. If they are cited within closed parentheses, use the ampersand (&) between them. If not enclosed in parentheses then use expanded "and".

Examples are given below:

"A recent study found a possible genetic cause of alcoholism (Pauling & Liu, 2005)."

"Pauling and Liu (2005) discovered a possible genetic cause of alcoholism."

- *Three to five authors*

With three to five authors, the first Reference to an article includes all authors. Subsequent citations in the same document may refer to the article by the principal author only plus "et al."

All authors must be present in the References section.

A recent study found a possible genetic cause of alcoholism (Pauling, Liu, & Guo, 2005).

Examples are given below:

"Pauling, Liu, and Guo (2005) conducted a study that discovered a possible genetic cause of alcoholism."

"Pauling et al. (2005) discovered a possible genetic cause of alcoholism."

"A recent study found a possible genetic cause of alcoholism (Pauling et al., 2005)."

- *Six or seven authors*

The correct format in the text is (First Author et al., Year) or First Author et al. (Year).

Examples given below:

"Brown et al. (2005) discovered a possible genetic cause of alcoholism."

In the Reference section, all authors' names should be included if there are six or seven authors.

- *Eight or more authors*

In the text, the first and all subsequent References should be to First Author et al. (Year) or (First Author et al., Year).

In the Reference list, list the first six authors, and then put an ellipsis (three periods), and then list the last author.

Example given below:

"Brown, A.B., Johnson, C., Laird, K., Howard, O. P., Evans, S., . . . Pritchard, J. (2004). ..... (study has eight or more authors)"

- *Multiple publications, same author*

If an author has multiple publications that you wish to cite, you use a comma to separate the years of publication in chronological order (oldest to most recent). If the publications occur in the same year, the *Publication Manual* recommends using suffixes a, b, c, etc. (note that corresponding letters should be used in the Reference list, and these References should be ordered alphabetically by title).

Example given below:

"Recent studies have found a possible genetic cause of alcoholism (Pauling, 2004, 2005a, 2005b)."

"Pauling (2004, 2005a, 2005b) has conducted studies that have discovered a possible genetic cause of alcoholism"

- *Multiple publications, different authors*

Follow the rules for one author above, and use a semicolon to separate articles. Citation should first be in alphabetical order of the author, then chronological.

Example given below:

"Recent studies found a possible genetic cause of alcoholism (Alford, 1995; Pauling, 2004, 2005; Sirkis, 2003)"

- *Direct quotes*

The same rules as above apply here, the format being (Author, Year, Page Number).

Example given below:

"When asked why his behaviour had changed so dramatically, Max simply said, "I think it's the reinforcement" (Pauling, 2004, p. 69)."

6.4 REFERENCE LIST AND PRINT SOURCES

The APA style guide prescribes that the *Reference* section, Bibliographies and other lists of names should be accumulated by surname first, and mandates inclusion of surname prefixes. For example, "Martin de Rijke" should be sorted as "de Rijke, M." and "Saif Al-Falasi" should be sorted as "Al-Falasi, S."

For names in non-English languages, follow the capitalisation standards of that language. For each of the source types below a hanging indent should be used where the first line is flush to the left margin and all other lines are indented.

Book by one author

Sheril, R. D. (1956). *The terrifying future: Contemplating color television*. San Diego, CA: Halstead.

Book by two authors

Kurosawa, J., & Armistead, Q. (1972). *Hairball: An intensive peek behind the surface of an enigma*. Hamilton, Ontario, Canada: McMaster University Press.

Chapter in an edited book

Mcdonalds, A. (1993). Practical methods for the apprehension and sustained containment of supernatural entities. In G. L. Yeager (Ed.),*Paranormal and occult studies: Case studies in application* (pp. 42–64). London, England: OtherWorld Books.

Dissertation (PhD or masters)

Mcdonalds, A. (1991). *Practical dissertation title* (Unpublished doctoral dissertation). University of Florida, Gainesville, FL.

Article in a journal with continuous pagination (nearly all journals use continuous pagination)

Rottweiler, F. T., & Beauchemin, J. L. (1987). Detroit and Narnia: Two foes on the brink of destruction. *Canadian/American Studies Journal, 54,* 66–146.

Kling, K. C., Hyde, J. S., Showers, C. J., & Buswell, B. N. (1999). Gender differences in self-esteem: A meta-analysis. *Psychological Bulletin, 125,* 470–500.

Article in a journal paginated separately Journal_pagination

Crackton, P. (1987). The Loonie: God's long-awaited gift to colourful pocket change? *Canadian Change, 64*(7), 34–37.

Article in a weekly magazine

Henry, W. A., III. (1990, April 9). Making the grade in today's schools. *Time, 135,* 28–31.

Article in a weekly magazine with DOI

Hoff, K. (2010, March 19). Fairness in modern society. *Science, 327,* 1467-1468. doi:10.1126/science.1188537

Article in a print newspaper

Wrong, M. (2005, August 17). "Never Gonna Give You Up" says Mayor. *Toronto Sol,* p. 4.

6.5 ELECTRONIC SOURCES

For electronic References, websites, and online articles, APA Style asserts some basic rules, including to direct readers specifically to the source material using URLs which work include retrieval date ONLY when content is likely to change (e.g., wikis) include all other relevant APA Style details for the source.

Online article based on a print source, with DOI (e.g., a PDF of a print source from a database)

Example is given below:

Krueger, R. F., Markon, K. E., Patrick, C. J., & Iacono, W. G. (2005). Externalizing psychopathology in adulthood: a dimensional-spectrum conceptualisation and its implications for DSM-V. Journal of Abnormal Psychology, 114, 537-550. doi:10.1037/0021-843X.114.4.537

Online article based on a print source, without DOI (e.g., a PDF of a print source from a database)

Marlowe, P., Spade, S., & Chan, C. (2001). Detective work and the benefits of color versus black and white. *Journal of Pointless Research, 11,* 123–127.

Online article from a database, no DOI, available ONLY in that database (proprietary content—not things like Ovid, EBSCO, and PsycINFO)

Liquor advertising on TV. (2002, January 18). Retrieved

from http://factsonfile.infobasepublishing.com/

or

Liquor advertising on TV. (2002, January 18). Retrieved from *Issues and Controversies* database.

Article in an Internet-only journal

McDonald, C., & Chenoweth, L. (2009). Leadership: A crucial ingredient in unstable times. *Social Work & Society, 7.* Retrieved

fromhttp://www.socwork.net/2009/1/articles/mcdonaldchenoweth

Article in an Internet-only newsletter (eight or more authors)

Paradise, S., Moriarty, D., Marx, C., Lee, O. B., Hassel, E., . . . Bradford, J. (1957, July). Portrayals of fictional characters in reality-based popular writing: Project update. *Off the Beaten Path, 7*. Retrieved from

http://www.newsletter.offthebeatenpath.news/otr/complaints.html

Article with no author identified

Britain launches new space agency. (2010, March 24). Retrieved

from http://news.ninemsn.com.au/technology/1031221/britain-launches-new-space-agency

Article with no author and no date identified (e.g., Wiki article)

Harry Potter. (n.d.). In *Wikipedia.* Retrieved March 12, 2010,

from http://en.wikipedia.org/wiki/Harry_Potter

Entry in an online dictionary or Reference work, no date and no author identified

Verisimilitude.(n.d.).In *Merriam-Webster's online dictionary* (11th ed.). Retrieved from http://www.merriam-webster.com/dictionary/verisimilitude

E-mail or other personal communication (cite in text only)

Monterey, personal communication, September 28, 2001)

6.6 BOOK ON CD, TAPE AND MOVIE

Nix, G. (2002). *Lirael, Daughter of the Clayr* [CD]. New York, NY: Random House/Listening Library.

Book on tape

Nix, G. (2002). *Lirael, Daughter of the Clayr* [Cassette Recording No. 1999-1999-1999]. New York, NY: Random House/Listening Library.

Movie

Gilby, A. (Producer), & Schlesinger, J. (Director). (1995). *Cold comfort farm* [Motion picture]. Universal City, CA: MCA Universal.

6.7 REFERENCE SPECIFICATIONS

Text citations: Source material must be documented in the body of the paper by citing the author(s) and date(s) of the sources. The underlying principle is that ideas and words of others must be formally acknowledged. The reader can obtain the full source citation from the list of References that follows the body of the paper.

When the names of the authors of a source are part of the formal structure of the sentence, the year of publication appears in parentheses following the identification of the authors. Consider the following example:

Wirth and Mitchell (1994) found that although there was a reduction in insulin dosage over a period of two weeks in the treatment condition compared to the control condition, the difference was not statistically significant. [Note: *and* is used when multiple authors are identified as part of the formal structure of the sentence. Compare this to the example in the following section.]

When the authors of a source are *not* part of the formal structure of the sentence, both the authors and year of publication appear in parentheses. Consider the following example:

Reviews of Research on religion and health have concluded that at least some types of religious behaviours are related to higher levels of physical and mental health (Gartner, Larson, & Allen, 1991; Koenig, 1990; Levin & Vanderpool, 1991; Maton & Pargament, 1987; Paloma & Pendleton, 1991; Payne, Bergin, Bielema, & Jenkins, 1991). [Note: *&* is used when multiple authors are identified in parenthetical material. Note also that when several sources are cited parenthetically, they are ordered alphabetically by first authors' surnames and separated by semicolons.]

When a source that has two authors is cited, both authors are included every time the source is cited.

When a source that has three, four, or five authors is cited, all authors are included the first time the source is cited. When that source is cited again, the first author's surname and "et al." are used. Consider the following example:

Reviews of Research on religion and health have concluded that at least some types of religious behaviours are related to higher levels of physical and mental health (Payne, Bergin, Bielema, & Jenkins, 1991).

Payne et al. (1991) showed that ...

When a source that has six or more authors is cited, the first author's surname and "et al." are used every time the source is cited (including the first time).

Every effort should be made to cite only sources that you have actually read. When it is necessary to cite a source that you have not read ("Grayson" in the following example) that is cited in a source that you have read ("Murzynski & Degelman" in the following example), use the following format for the text citation and list only the source you have read in the References list:

Grayson (as cited in Murzynski & Degelman, 1996) identified four components of body language that were related to judgments of vulnerability.

To cite a personal communication (including letters, emails, and telephone interviews), include initials, surname, and as exact a date as possible. Because a personal communication is not "recoverable" information, it is not included in the References section. For the text citation, use the following format:

B. F. Skinner (personal communication, February 12, 1978) claimed ...

To cite a Web document, use the author-date format. If no author is identified, use the first few words of the title in place of the author. If no date is provided, use "n.d." in place of the date. Consider the following examples:

Degelman (2009) summarises guidelines for the use of APA writing style.

Changes in Americans' views of gender status differences have been documented (*Gender and Society*, n.d.).

To cite the Bible, provide the book, chapter, and verse. The first time the Bible is cited in the text, identify the version used. Consider the following example:

"You are forgiving and good, O Lord, abounding in love to all who call to you" (Psalm 86:5, New International Version). [Note: No entry in the References list is needed for the Bible.]

Quotations: When a direct quotation is used, always include the author, year, and page number as part of the citation.

A quotation of fewer than 40 words should be enclosed in double quotation marks and should be incorporated into the formal structure of the sentence. Consider the following example:

Patients receiving prayer had "less congestive heart failure, required less diuretic and antibiotic therapy, had fewer episodes of pneumonia, had fewer cardiac arrests, and were less frequently intubated and ventilated" (Byrd, 1988, p. 829).

A lengthier quotation of 40 or more words should appear (without quotation marks) apart from the surrounding text, in block format, with each line indented five spaces from the left margin.

References: All sources included in the References section must be cited in the body of the paper (and all sources cited in the paper must be included in the References section).

Pagination: The References section begins on a new page.

Heading: "References" (centered on the first line below the running head)

Format: The References (with hanging indent) begin on the line following the References heading. Entries are organised alphabetically by surnames of first authors. Most Reference entries have the following components:

Authors: Authors are listed in the same order as specified in the source, using surnames and initials. Commas separate all authors. When there are eight or more authors, list the first six authors followed by three ellipses (...) and then the final author. If no author is identified, the title of the document begins the Reference.

Year of Publication: In parentheses following authors, with a period following the closing parenthesis. If no publication date is identified, use "n.d." in parentheses following the authors.

Source Reference: Includes title, journal, volume, pages (for journal article) or title, city of publication, publisher (for book). Italicize titles of books, titles of periodicals, and periodical volume numbers.

Electronic Retrieval Information: Electronic retrieval information may include digital object identifiers (DOIs) or uniform resource locators (URLs). DOIs are unique alphanumeric identifiers that lead users to digital source material. To learn whether an article has been assigned a DOI, go to http://www.crossref.org/guestquery/.

Example of APA-formatted Internet References: Go to

http://www.vanguard.edu/uploadedFiles/Psychology/References.pdf

Examples of sources

Journal article with DOI

Murzynski, J., & Degelman, D. (1996). Body language of women and judgments of vulnerability to sexual assault. *Journal of Applied Social Psychology, 26,* 1617-1626. doi:10.1111/j.1559-1816.1996.tb00088.x

Journal article without DOI, print version

Koenig, H. G. (1990). Research on religion and mental health in later life: A review and commentary. *Journal of Geriatric Psychiatry, 23,* 23-53.

Journal article without DOI, retrieved online

For articles retrieved from databases, include the URL of the journal home page. Database information is not needed. Do not include the date of retrieval.]

Aldridge, D. (1991). Spirituality, healing and medicine. *British Journal of General Practice, 41,* 425-427. Retrieved from http://www.rcgp.org.uk/publications/bjgp.aspx

Book

Paloutzian, R. F. (1996). *Invitation to the psychology of religion* (2nd ed.). Boston, MA: Allyn and Bacon.

Informally published Web document

Degelman, D. (2009). *APA style essentials.* Retrieved from http://www.vanguard.edu/faculty/ ddegelman/detail.aspx?doc_id=796

Informally published Web document (no date)

Nielsen, M. E. (n.d.). *Notable people in psychology of religion.* Retrieved from http://www.psywww.com/psyrelig/psyrelpr.htm

Informally published Web document (no author, no date)

Gender and society. (n.d.). Retrieved from http://www.trinity.edu/~mkearl/gender.html

6.8 ABSTRACT FROM SECONDARY DATABASE

Garrity, K., & Degelman, D. (1990). Effect of server introduction on restaurant tipping. *Journal of Applied Social Psychology, 20,* 168-172. Abstract retrieved from PsycINFO database.

Article or chapter in an edited book Shea, J. D. (1992). Religion and sexual adjustment. In J. F. Schumaker (Ed.),*Religion and mental health* (pp. 70-84). New York, NY: Oxford University Press.

Diagnostic and Statistical Manual of Mental Disorders

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author.

6.9 FOOTNOTES

Footnotes: Content footnotes are occasionally used to support substantive information in the text. A content footnote may be placed at the bottom of the page on which it is discussed or on a separate page following the References.

Pagination: Footnotes begin on a separate page.

Heading: "Footnotes" is centered on the first line below the running head.

Format: Indent the first line of each footnote 5-7 spaces and number the footnotes (slightly above the line) as they are identified in the text.

Example of APA-formatted

Footnotes: http://www.vanguard.edu/uploadedFiles/Psychology/Footnote.pdf

Tables: A common use of tables is to present quantitative data or the results of statistical analyses (such as ANOVA). See the *Publication Manual* (2010, pp. 128-150) for detailed examples. Tables must be mentioned in the text.

Pagination: Each Table begins on a separate page.

*Heading: "*Table 1" (or 2 or 3, etc.) is typed flush left on the first line below the running head. Double-space and type the table title flush left (italicized in uppercase and lowercase letters).

Example of APA-formatted Tables.

http://www.vanguard.edu/uploadedFiles/Psychology/table.pdf

Figures: A common use of Figures is to present graphs, photographs, or other illustrations (other than tables). See the *Publication Manual* (2010, pp. 150-167) for detailed examples.

Pagination: Figures begin on a separate page.

Figure Caption: "*Figure 1.*" (or 2 or 3, etc.) is typed flush left and italicized on the first line below the figure, immediately followed on the same line by the caption (which should be a brief descriptive phrase).

Example of APA-formatted

Figure: http://www.vanguard.edu/uploadedFiles/Psychology/figure.pdf

Appendixes: A common use of appendixes is to present unpublished tests or to describe complex equipment or stimulus materials.

Pagination: Each Appendix begins on a separate page.

*Heading :*If there is only one appendix, "Appendix" is centered on the first line below the manuscript page header. If there is more than one appendix, use Appendix A (or B or C, etc.). Double-space and type the appendix title (centered in uppercase and lowercase letters).

Format: Indent the first line 5-7 spaces.

Example of APA-formatted Appendix

http://www.vanguard.edu/uploadedFiles/Psychology/Appendix.pdf

6.10 GENERAL GUIDELINES TO WRITE REFERENCES

Start on a new page. Center the word References at the top. As usual, double space.

Any citations made in the manuscript must be presented in this section and vice versa. That is, if something is not cited in the text, then it should not appear in this section. In still other words, this is not a bibliography.

In any of the previous sections, whenever you say something like studies have shown you must provide a citation. This section tells the reader where they can find these citations.

This section is alphabetized by last name (of the first author involved in the study).

A hanging indent is employed for each Reference, that is, the first line is not indented and the rest are five-space indented.

For each author, give the last name followed by a comma and the first (and middle) initials followed by periods.

Separate multiple authors with commas and the last author with the ampersand ('&') rather than the word "and".

After the author(s) comes the year (in parentheses and followed by a period).

For a journal Reference, italicize the title of the journal and the volume number. Note that issue numbers are typically not included. Also, capitalize the important words of the journal title.

For a book Reference, just italicize the title. Only capitalise the first word of the title. Do include the city, state (as a two-letter abbreviation without periods), and the publisher's name.

See the example Reference section. It provides several types of References, including: Single and multiple author, journal articles, book, and book chapter, web page, as well as a government document.

6.11 LET US SUM UP

In this unit we have tried to present how the references shouldbe written. We have tried to differentiate between references and bibliography. We pointed out that a list of Reference is an integral part of the Research Report. It may be headed as 'References' or 'Bibliography'. While Bibliography is a comprehensive term which includes, in addition to referred literature, other related and very useful literature which readers may like to read which the Researcher has himself read but not referred to it in the text of the thesis. All literature referred to in the text must appear in the Reference list. We learnt all about the guidelines to follow while writing references, in the style of American Psychological Association (APA) format.

We also discussed how to rite the reference when it is a single author, more than one author and multiple authors. When there is more than one author, the initial of the first author must be followed by 'a comma'. The wording of the title should appear exactly as it does on the title page of the book or first page of the article. The name of the journal should either appear as it is or be abbreviated according to accepted abbreviations.

We also learned about how to write the reference for the same author who has published in different years and also in the same year. How to write a journal reference and a book reference were also presented.

6.12 UNIT END QUESTIONS

1) What is the significance of References in a Research Report?

2) How will you differentiate between references and bibliography

3) Elucidate the style of Referencing according to the APA format, especially single author and multiple authors

4) If the same author has multiple books how would you write the reference for them?

5) Elaborate upon the central guidelines for writing References from diverse sources. Give suitable examples.

6) How will you write references for the internet resources?

7) How will you write the references for internet books in particular? Give examples.

6.13 SUGGESTED READINGS

Publication Manual of the American Psychological Association (Sixth Edition, 2009). American Psychological Association. Washington, DC.

Singh, AK. (2009). *Test Measurements and Research Methods in Behavioural Sciences* (Fifth Edition). Bharti Bhawan Publishers & Distributors.