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Module: **Research Methods in Education and Didactics**  
Course: **Research Methodology**

## **Unit 2: Research Methodology**

1. Research Design
2. Research Methods versus Methodology
3. Research and Scientific Method
4. Research Process
  1. Formulating the Research Problem
  2. The Review of Literature
  3. The Development of Hypotheses
  4. Preparing the Research Design
  5. Determining Sample Design
  6. Collecting the Data
  7. Execution of the project:
  8. Analysis of Data
  9. Hypothesis-testing
  10. Generalizations and Interpretation
  11. Preparation of the Report or the Thesis

### **“ Research Design**

**Meaning of Research Design :** Before starting a research, the investigator will look for a problem, he will read books, journals, research reports and other related literature. Based on this, he will finalise the topic for research. During this process, he will be in close contact with his guide. As soon as the topic is decided, the first task is to decide about design.

**Research design** is a structure within which research is conducted. It constitutes the blueprint for the collection, measurement and analysis of data.

- According to Gay and Airasian (2000), “A design is general strategy for conducting a research study. The nature of the hypothesis, the variables involved, and the constraints of the “real world” all contribute to the selection of design.”

- Kothari (1988) says, “Decisions regarding WHAT?, WHERE?, WHEN?, HOW MUCH?, by WHAT? means concerning an inquiry or a research study constitute research design.

- Thus, it can be said that research design is an outline of what the researcher will do from writing of objectives, hypotheses and its operational implications to find analysis of data.

Research design should be able to convey following :

- “ What is the study about?
- “ Where will study be carried out?
- “ What type of data is necessary?
- “ Where necessary data is available?
- “ How much time is needed to complete the study?
- “ What will be the sampling design?
- “ Which tools will be identified to collect data?
- “ How data will be analysed?

In short, any efficient research design will help the researcher to carry out the study in a systematic way.

#### **PURPOSE OF RESEARCH DESIGN :**

- “ A research design helps the investigator to obtain answers to research problem and issues involved in the research, since it is the outline of entire research process.
- “ Design also tells us about how to collect data, what observation are to be carry out, how to make them, how to analyse the data.
- “ Design also guides investigator about statistical techniques to be used for analysis.
- “ Design also guides to control certain variables in experimental research.

Thus, design guides the investigator to carry out research step by step in an efficient way. The design section is said to be complete / adequate if investigator could carry out his research by following the steps described in design.

#### **NEED FOR RESEARCH DESIGN**

- “ **Research design** is needed because it facilitates the smooth sailing of the various research operations, thereby making research as efficient as possible yielding maximal information with minimal expenditure of effort, time and money.
- “ Just as for better, economical and attractive construction of a house, we need a blueprint (or what is commonly called the map of the house) well thought out and prepared by an expert architect, similarly we need a research design or a plan in advance of data collection and analysis for our research project.
- “ **Research design** stands for advance planning of the **methods** to be adopted for collecting the relevant data and the techniques to be used in their analysis, keeping in view the objective of the research and the availability of staff, time and money.

## FEATURES OF A GOOD DESIGN

- “ A good design is often characterised by adjectives like flexible, appropriate, efficient, economical and so on.
- “ Generally, the design which minimises bias and maximises 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 most appropriate and efficient design in respect of many research problems.
- “ 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. A design may be quite suitable in one case, but may be found wanting in one respect or the other in the context of some other research problem. One single design cannot serve the purpose of all types of research problems.
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- “ A **research design** appropriate for a particular research problem, usually involves the consideration of the following factors:

- (i) the means of obtaining information;
- (ii) the availability and skills of the researcher and his staff, if any;
- (iii) the objective of the problem to be studied;
- (iv) the nature of the problem to be studied; and
- (v) the availability of time and money for the research work.

## Research Methods versus Methodology

- “ **Research methods** may be understood as all those methods/techniques that are used for conduction of research. Research methods or techniques\*, thus, refer to the methods the researchers *use in performing research operations*.
- “ In other words, all those methods which are used by the researcher during the course of studying his research problem are termed as research methods. Since the object of research, particularly the applied research, is to arrive at a solution for a given problem, the available

data and the unknown aspects of the problem have to be related to each other to make a solution possible.

“ \*At times, a distinction is also made between research techniques and research methods.

- **Research techniques** refer to the behaviour and instruments we use in performing research operations such as making observations, recording data, techniques of processing data and the like.
- **Research methods** refer to the behaviour and instruments used in selecting and constructing research technique

“ Keeping this in view, **research methods** can be put into the following three groups:

1. In the first group we include those methods which are concerned with the collection of data. These methods will be used where the data already available are not sufficient to arrive at the required solution;
2. The second group consists of those statistical techniques which are used for establishing relationships between the data and the unknowns;
3. The third group consists of those methods which are used to evaluate the accuracy of the results obtained.

“ **Research methods** falling in the above stated last two groups are generally taken as the analytical tools of research.

- While preparing the design of the study, it is necessary to think of research method. It is simply the method for conducting research.

- Generally, such methods are divided into quantitative and qualitative methods. Such quantitative methods include descriptive research, evaluation research and assessment research.
- Assessment type of studies include surveys, public opinion polls, assessment of educational achievement. Evaluation studies include school surveys, follow up studies.
- The term **methodology** seems to be broader, in the sense it includes nature of population, selection of sample, selection / preparation of tools, collection of data and how data will be analysed. Here the method of research is also included.

\* **Research methodology** is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically. In it we study the various steps that are generally adopted by a researcher in studying his research problem along with the logic behind them.

“ It is necessary for the researcher to know not only the research methods/techniques but also the methodology.

“ Researchers not only need to know how to develop certain indices or tests, how to calculate the mean, the mode, the median or the standard deviation or chi-square, how to apply particular research techniques, but they also need to know which of these methods or techniques, are relevant and which are not, and what would they mean and indicate and why.

- “ Researchers also need to understand the assumptions underlying various techniques and they need to know the criteria by which they can decide that certain techniques and procedures will be applicable to certain problems and others will not.
- “ All this means that it is necessary for the researcher to design his methodology for his problem as the same may differ from problem to problem.
- “ For example, an architect, who designs a building, has to consciously evaluate the basis of his decisions, i.e., he has to evaluate why and on what basis he selects particular size, number and location of doors, windows and ventilators, uses particular materials and not others and the like. Similarly, in research the scientist has to expose the research decisions to evaluation before they are implemented. He has to specify very clearly and precisely what decisions he selects and why he selects them so that they can be evaluated by others also.
- “ From what has been stated above, we can say that research methodology has many dimensions and research methods do constitute a part of the research methodology.

**The scope of research methodology** is wider than that of research methods.

- “ Thus, when we talk of **research methodology** we not only talk of the research methods but also consider the logic behind the methods we use in the context of our research study and explain why we are using a particular method or technique and why we are not using others so that research results are capable of being evaluated either by the researcher himself or by others. Why a research study has been undertaken, how the research problem has been defined, in what way and why the hypothesis has been formulated, what data have been collected and what particular method has been adopted, why particular technique of analysing data has been used and a host of similar other questions are usually answered when we talk of research methodology concerning a research problem or study.

## Difference Between Research Methods and Methodology

<b>Research Method</b>	<b>Research Methodology</b>
The scope is lesser than research methodology	The scope is very wider than research methods
It is part of research methodology	It has many dimension
Research method seeks to answer: what did the researcher use to complete his research.	Research methodology seeks to answer: how did the researcher complete his study.
Research methods are the techniques and tools by which you research a subject or a topic.	Methodology explains and justifies the techniques and tools by which you may proceed with your research.
Research methods involve the tasks of conducting experiments, tests, surveys, and the like utilizing the knowledge and skills learned through research methodology.	Research methodology involves the learning of various techniques to conduct research and acquiring knowledge to perform tests, experiments, surveys, and critical analysis.
The research method aims at finding solutions to research problems.	Research methodology ensures the employment of the correct procedures to solve the problems.
Research methods are the end of any scientific or non-scientific research.	Research methodology paves the way to choose appropriate research methods and thus is the beginning of any research.

## Summary

- “ Conducting a research study should be started off by considering how the researcher views the observed social phenomena, which leads to the dominant **research design** to be applied.
- “ The choice of a **research design** leads to a relevant **research methodology**.
- “ The **research design** then needs to be developed to link **research methodology** and a set of **research methods** in order to enable the drawing of logical and valid inferences.
- “ It is worth noting that the research purpose and research questions are the fundamental basis on which to craft a **research design**.
- “ **Research and Scientific Method**
- “ For a clear perception of the term research, one should know the meaning of **scientific method**.
- “ The two terms, **research** and **scientific method**, are closely related.
- “ Research, as we have already stated, can be termed as ‘an inquiry into the nature of, the reasons for, and the consequences of any particular set of circumstances, whether these circumstances are experimentally controlled or recorded just as they occur.’
- “ Further, ‘research implies the researcher is interested in more than particular results; he is interested in the repeatability of the results and in their extension to more complicated and general situations.’
- “ On the other hand, the philosophy common to all research methods and techniques, although they may vary considerably from one science to another, is usually given the name of scientific method.
- “ Pearson writes, ‘The scientific method is one and same in the branches (of science) and that method is the method of all logically trained minds – the unity of all sciences consists alone in its methods, not its material; the man who classifies facts of any kind whatever, who sees their mutual relation and describes their sequences, is applying the Scientific Method and is a man of science.’

\* **Scientific method** is the pursuit of truth as determined by logical considerations. The ideal of science is to achieve a systematic interrelation of facts.

- “ **Scientific method** attempts to achieve ‘this ideal by experimentation, observation, logical arguments from accepted postulates and a combination of these three in varying proportions.’
- “ In **scientific method**, logic aids in formulating propositions explicitly and accurately so that their possible alternatives become clear. Further, logic develops the consequences of such alternatives, and when these are compared with observable phenomena, it becomes possible for the researcher or the scientist to state which alternative is most in harmony with the observed facts. All this is done through experimentation and survey investigations which constitute the integral parts of **scientific method**.
- “ The **scientific method** is, thus, based on certain basic postulates which can be stated as under:

- " 1. It relies on empirical evidence;
- " 2. It utilizes relevant concepts;
- " 3. It is committed to only objective considerations;
- " 4. It presupposes ethical neutrality, i.e., it aims at nothing but making only adequate and correct statements about population objects;
- " 5. It results into probabilistic predictions;
- " 6. Its methodology is made known to all concerned for critical scrutiny is for use in testing the conclusions through replication;
- " 7. It aims at formulating most general axioms or what can be termed as scientific theories.
- " Thus, "the **scientific method** encourages a rigorous, impersonal mode of procedure dictated by the demands of logic and objective procedure."
- " Accordingly, **scientific method** implies an objective, logical and systematic method, i.e., a method free from personal bias or prejudice, a method to ascertain demonstrable qualities of a phenomenon capable of being verified, a method wherein the researcher is guided by the rules of logical reasoning, a method wherein the investigation proceeds in an orderly manner and a method that implies internal consistency.

#### " **Research Process**

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