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MVP-009 Research Methodology
Guess Paper-1

Q1. Explain the need for scientific methodology in extension research.

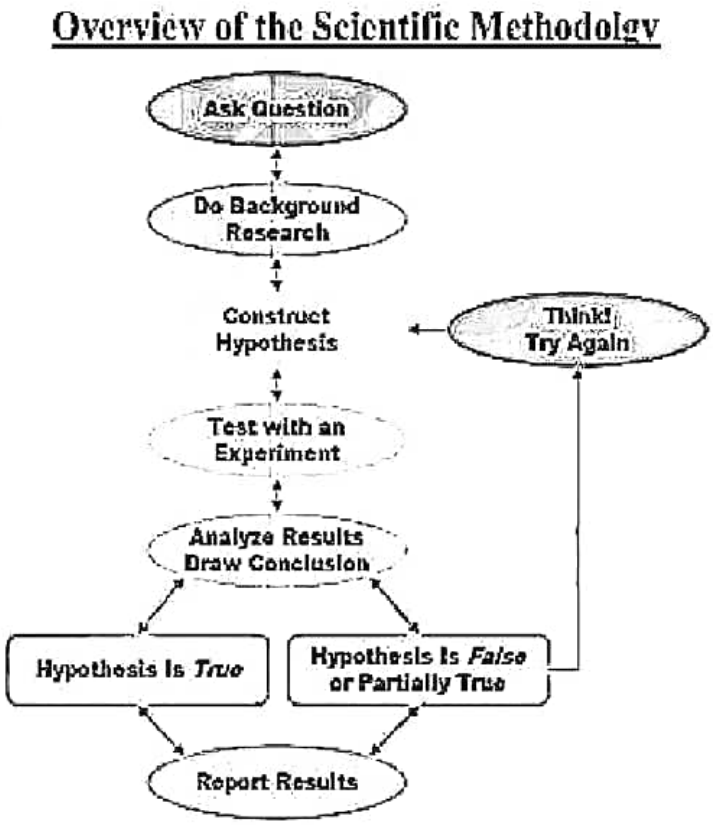
Ans. Scientific problem solving involves two basic types of reasoning, generally called induction and deduction. Induction involves gathering together a collection of bits of data-- observations, experimental results, whatever kinds of information are available--and formulating a generalization which reasonably explains all of them. In general, it is 'from particular to general'. This is analogous to the formation of a hypothesis. You make a set of observations, then hypothesize an explanation which accounts for all of the observations.

You can see why forming a hypothesis is sometimes described as forming an "educated guess." It is a guess in the sense that you are devising an explanation, but it is educated because (1) it must be reasonable (ie, sensible) and, (2) it either has to be consistent with what we already think we know, or it has to include a very good justification for deciding that what we think we know is wrong. This is a vital kind of self-policing. One of the most significant strengths of scientific knowledge is the degree to which it is self-correcting, and this is one part of that. No matter how good an idea is, if it violates the centuries worth of hard won knowledge have accumulated, there must be extremely good reason (based on a lot of evidence) to accept the new idea and throw out all of the old ones. In general, induction is the generalisation based on logical reasoning from particular case to general, i.e, it is the process by which scientist forms a theory and explains the observed fact. Or we proceed from laws to facts. Now let us see what deduction is.

Deduction begins with a generalization. Predictions are made based on the generalization, and those predictions are challenged. In general, it is 'from general to particular'. This, in essence, is the testing part of science. One can not say enough about how important this aspect of science is. "Testability" is a requirement for any useful scientific concept. But, of course, there are many, many different kinds of ways to test predictions. Some require laboratories and lots of expensive equipment, but many don't. History scientists have demonstrated immense creativity in devising ingenious ways to challenge their predictions. Deduction is formed from the general antecedently known facts to the particular instants, i.e, we derive observable facts form the general theories. Or we proceed from facts to laws.

Scientific research is an investigation using the scientific method to discover the answer to a scientific problem. Before starting your project, you need to understand the scientific method. The scientific method is the "tool" that scientists use to find the answers to questions. It is the process of thinking through the possible solutions to a problem and testing each possibility to find the best solution.

The scientific method involves the following steps: identifying the problem, stating a hypothesis, conducting project experimentation, and reaching a conclusion.



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Q2. Describe the different types of variables.

Ans. Types of Variables: The variables can be classified as follows :

- Independent variable and dependent variable
- Active variable and attribute variable
- Continuous variable and categorical variable. Let us see one by one.

(1) **Independent variable and Dependent Variable** Dependent variable is the one about which the experimenter or researcher makes predictions. Independent variable is the presumed cause of dependent variable, the presumed effect. The independent variable is the antecedent and dependent variable is the consequent (kerlinger, 1964). Explain: If X is the independent variable and Y is the dependent variable, Y changes in relation to X. If Y is Adoption rate and X is knowledge, we can conclude level of knowledge affects adoption rate. Independent variable is the one, which is manipulated, measured or selected by the researchers Example: Effect of extension methods on farmer's knowledge. Here farmer's knowledge is dependent variable and extension methods are independent variables.

(2) **Active and Attribute Variables:** Attribute variables are qualitative variables, That can only be measured but not manipulated. The human characteristics such as intelligence, socio-economic status, sex etc. one examples of attribute variables Active variable is one which can be manipulated. The 'fertilizer dose' is an example of active variable which can be manipulated. Literature 'leadership style' is also and example of active variable.

(3) **Continuous and categorical variable:** According to kerlinger (1964) 'a continuous variable is capable of taking in an ordered set of values nether a certain range'. 'Adoption of farming practices is and example of continuous variable. Categorical variables belong to nominal measurement according to kerlinger (1964) to categories means to assign an object to a sub-class an subject of a class and the basis of the objects having or not having the characteristics that defines the sub-set. An example of dichotomous categorical variable is sex male and female.

Q3. What is the importance of hypothesis in social research?

Ans. Hypothesis in social research refers to a tentative statement or assumption about the relationship between two or more variables. It is a testable prediction that serves as a starting point for conducting a study. Hypotheses are important in social research for several reasons:

- **Direction and focus:** Hypotheses provide a clear direction and focus for the research. They help researchers identify the variables that need to be studied and the relationships that need to be explored. For example, a hypothesis might state that "**higher levels of education lead to higher income levels.**" This statement provides a clear direction for the researcher to investigate the relationship between education and income.
- **Basis for research design:** Hypotheses serve as the foundation for designing a research study. They help researchers choose the appropriate methods, techniques, and tools to collect and analyze data. For instance, if a researcher wants to test the hypothesis that "**participation in sports reduces the likelihood of engaging in criminal behavior,**" they might design a study that compares crime rates among individuals who participate in sports and those who do not.
- **Testability:** Hypotheses are testable statements that can be either supported or refuted by empirical evidence. This testability is crucial for the scientific process, as it allows researchers to build on existing knowledge and contribute to the understanding of social phenomena. For example, if a hypothesis states that "**social media use increases feelings of loneliness,**" researchers can collect data on social media usage and loneliness levels to test this assumption.
- **Explanation and prediction:** Hypotheses help researchers explain and predict social phenomena. By identifying relationships between variables, hypotheses can provide insights into the underlying mechanisms and processes that drive social behavior. For instance, a hypothesis that "**unemployment leads to increased crime rates,**" might suggest that addressing unemployment could help reduce crime.

Sources of hypothesis in social research:

- **Theory:** Hypotheses can be derived from existing theories in the field. Theories provide a framework for understanding social phenomena and can suggest relationships between variables that can be tested through research. For example, social learning theory might suggest the hypothesis that "**children who witness violence in their homes are more likely to exhibit aggressive behavior.**"
- **Previous research:** Hypotheses can be based on the findings of previous studies. Researchers can build on existing knowledge by testing new relationships or exploring the same relationships in different contexts. For example, if a previous study found a relationship between poverty and crime in urban areas, a researcher might hypothesize that the same relationship exists in rural areas.
- **Observations and personal experiences:** Researchers can develop hypotheses based on their own observations and experiences. These insights can provide a starting point for investigating social phenomena.

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For example, a researcher who notices a high rate of teenage pregnancy in their community might hypothesize that a lack of access to sexual education is a contributing factor.

- **Expert opinions and literature reviews:** Consulting experts in the field and reviewing existing literature can help researchers identify gaps in knowledge and generate hypotheses. For instance, a review of research on the effects of social media on mental health might reveal conflicting findings, leading a researcher to hypothesize that certain factors, such as the type of social media platform or the amount of time spent online, might moderate these effects.

In conclusion, hypotheses play a crucial role in social research by providing direction, focus, and a basis for research design. They are derived from various sources, including theory, previous research, observations, and expert opinions. By testing hypotheses, researchers can contribute to the understanding of social phenomena and inform policies and interventions aimed at addressing social issues.

Q4. What a good research design should ensure?

Ans. Research design is a choice of investigator about the component of his project and development of certain components of the design. It is a planning stage of research which is usually made logically visualizing its practicability. The following are the characteristics of good research design:

Objectivity: Objectivity means that the procedures and findings are not influenced or changed by researcher feelings, beliefs after the research has begun. Objective studies are those of a detached, impersol, unbiased or unprejudicial nature (Ray 1999).

The investigator who uses close ended questionnaires (Questionnaires in which each item is supplied with certain alternatives) are said to be an objective tool. In contrast, the open-ended questionnaires (questionnaires in which the respondents are allowed to give free responses to each items) allow great disagreement among the score (Gupta 2007).

Generality: Generality means the ability to generalise from a particular phenomenon under study. Conclusions or generalizations drawn should be of universal application. In social sciences, complete universality is, however, rarely achieved. Universality in such cases means that the findings of research may be applicable in a situation similar to the one under which the study was conducted.

- **Validity** Any measuring instrument is said to be valid when it measures what it purposes to measure. e.g. An intelligent test, constructed for measuring intelligence should measure only intelligence and nothing else.
- **Verifiability** Verifiability is the characteristic which indicates that the observed phenomena or facts can be verified by subsequent studies.
- **Predictability** This means that the results of the study can predict the future with sufficient accuracy.
- **Reliability:** Reliability refers to 'consistency' throughout a series of measurements. There are different methods in determing the reliability of the response given out by respondent. Some of these methods are: using "check items" administering the same test repeatedly, using a series of parallel' forms etc. (Ray 1999).

You must know that a good research design should ensure that-

- The measuring instrument can yield objective, reliable and valid data.
- The requisite size of the sample collected by using most appropriate technique of sample selection.
- The 'population' is defined in unequivocal terms.
- The appropriate statistical analysis has been employed.
- The findings of the present study can be generalized without being contaminated by errors of measurement or sampling error (Gupta 2007).

Q5. What are the limitations of expost-facto research design?

Ans. Ex post facto research design, also known as retrospective or causal-comparative design, is a type of non-experimental research where the researcher observes and analyzes the effects of an independent variable that cannot be manipulated due to ethical or practical reasons. While ex post facto research provides valuable insights into naturally occurring relationships, it has several limitations that should be considered.

(1) **Lack of Control:** Ex post facto research lacks the experimental control that true experimental designs offer. In a true experiment, researchers can manipulate the independent variable and randomly assign participants to different conditions, ensuring a more rigorous control over potential confounding variables. In ex post facto designs, the researcher merely observes existing conditions, making it challenging to establish a cause-and-effect relationship.

(2) **Difficulty in Establishing Causation:** Causal inferences are inherently challenging in ex post facto research. Since the researcher cannot manipulate the independent variable, establishing a direct causal link between the independent and dependent variables becomes more complicated. The absence of experimental control makes it difficult to rule out alternative explanations or third variables that could be influencing the observed relationships.

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(3) **Retrospective Nature:** Ex post facto research is retrospective, meaning it looks backward in time to analyze existing conditions. This retrospective nature introduces issues related to memory biases and the accuracy of historical data. Participants may not accurately recall past events or conditions, leading to potential inaccuracies in the data collected. This limitation can compromise the reliability of the study's findings.

(4) **Selection Bias:** Participants in ex post facto research are not randomly assigned to groups, which opens the study to selection bias. Individuals may self-select into certain groups based on pre-existing characteristics or conditions. This self-selection can introduce confounding variables, making it challenging to attribute observed differences solely to the independent variable.

(5) **Ethical Constraints:** In some cases, the independent variable in ex post facto research involves naturally occurring events or conditions that cannot be manipulated ethically. For example, studying the impact of a traumatic event on psychological well-being is ethically challenging to manipulate. While ex post facto designs allow researchers to explore these real-world phenomena, the inability to manipulate variables limits the researcher's ability to draw firm causal conclusions.

(6) **Limited Generalizability:** The findings of ex post facto research may have limited generalizability. Since the study relies on existing conditions and often lacks experimental control, the applicability of the results to broader populations or different contexts may be constrained. The specific conditions under investigation may not be representative of other situations, limiting the external validity of the study.

(7) **Difficulty in Replication:** Replicating ex post facto studies can be challenging due to the unique and often unrepeatable nature of the conditions under investigation. True experimental designs, with their controlled manipulation of variables, are typically more amenable to replication, contributing to the cumulative nature of scientific knowledge.

(8) **Confounding Variables:** Ex post facto research is susceptible to confounding variables, which are variables that are not part of the research hypothesis but may influence the observed outcomes. Since the researcher lacks control over the independent variable, it becomes difficult to account for all potential confounding factors, leading to increased uncertainty in the interpretation of results.

(9) **Limited Insight into Mechanisms:** Ex post facto research is often focused on describing associations rather than explaining the underlying mechanisms. Unlike experimental designs that allow researchers to manipulate variables and explore causal pathways, ex post facto designs may provide less insight into how or why observed relationships exist.

(10) **Difficulty in Drawing Policy Implications:** Because ex post facto research is often limited in its ability to establish causation, drawing policy implications based on such studies can be challenging. Policymakers may prefer evidence from experimental designs that demonstrate a more robust cause-and-effect relationship.

In conclusion, while ex post facto research designs offer valuable opportunities to explore relationships in real-world settings where experimental manipulation is impractical or unethical, researchers must be aware of the limitations inherent in this approach. The lack of experimental control, challenges in establishing causation, selection biases, and difficulties in generalization all contribute to the nuanced nature of findings derived from ex post facto research. Careful consideration of these limitations is crucial for researchers and practitioners when interpreting and applying the results of studies utilizing this design.

Q6. What is the difference between experimental and descriptive research design.

Ans. Descriptive Research: Descriptive research refers to research which describes a phenomenon or else a group under study and it is easy to do in social sciences due to manipulating variables. It is mainly useful in gathering data on a certain population, situations and events. Descriptive research is more towards collecting data and try to find out some insight out of that data using statistical analysis.

Example of descriptive research includes population census and product marketing surveys etc.

Experimental Research: Experimental research refers to research where the researcher manipulates the variable to come to an conclusion or finding and it is difficult to do in social sciences due to manipulating variables. It is useful in finding out the cause effect of a casual relationship and correlation. Experimental research is also do this same sort of analysis but also it always analyzes where the data of an experiment comes from.

Example of experimental research includes laboratory experiments.

Difference between Descriptive Research and Experimental Research :

S.NO.	DESCRIPTIVE RESEARCH	EXPERIMENTAL RESEARCH
01.	Descriptive research refers to research which describes a phenomenon or else	Experimental research refers to research where the researcher manipulates the

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	a group under study.	variable to come to an conclusion or finding.
02.	Descriptive research is easy to do in social sciences due to manipulating variables.	Experimental research is difficult to do in social sciences due to manipulating variables.
03.	It is useful in gathering data on a certain population, situations and events.	It is useful in finding out the cause effect of a casual relationship and correlation.
04.	In descriptive research the researcher observe the things, situation or events and describes the best of it.	In experimental research the researcher researches the things mainly in closed environment or laboratory and results the best output of it.
05.	Descriptive research cannot determine the causality of events and as such cannot make future predictions.	Experimental research accurately determines causality and therefore can make future predictions.
06.	Mainly Descriptive research tries to answer the question "What is".	Mainly Experimental research tries to answer the question "What if".
07.	Descriptive research typically includes sociological and psychological, political science studies.	Experimental research typically includes biological, forensic studies, other laboratory studies.
08.	It uses both quantitative and qualitative methodologies.	It primarily uses quantitative methodology.
09.	Descriptive research is more towards collecting data and try to find out some insight out of that data using statistical analysis.	Experimental research is also do this same sort of analysis but also it always analyzes where the data of an experiment comes from.

Q7. Explain the concept and importance of sampling.

Ans. Sampling is a process, which allows us to study a small group of people from the large group to derive inferences that are likely to be applicable to all the people of the large group.

Sometimes it is not feasible to study a whole group. For example, social work researchers might be interested in studying the problems of the mentally challenged children, mentally ill, prison inmates, street children or some other large group of people. It would be difficult rather impossible to study all members of these groups. That is the reason the researcher selects a sample (small group) of mentally challenged children and collects data for his study.

A sample is a subset of a population and the process of selecting units (e.g., people, organizations) from a population is referred to as sampling. In most cases, it is difficult in terms of the high cost and time involved in collecting the information from the entire population. With sampling, the researchers are able to collect the information from a portion of the population, which otherwise was not possible due to the large size of the population and other constraints like time and cost. Based on the sample findings, the parameters for the population are inferred.

The results of the sample studies may be generalized for the population however care is to be taken so that sampling errors are kept to the minimum. The concept of sampling and population is shown in Fig 4.1.

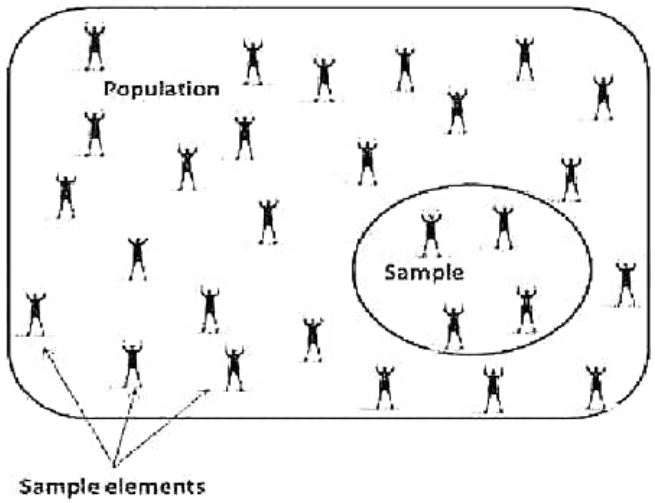

Fig. 4.1: Population, Sample, and sample elements

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