

GUIDE TO RESEARCH

Understanding the meaning of research, its objective and process is very essential for a researcher to come up with work that is capable of resulting in a correct prediction or reliable outcome. For student researchers of science, social science and language departments it is essential to follow 'scientific method' of research.

Content:

- **What is research:**
- **Characteristics of Research**
- **Types of Research:**
- **Phases of scientific method of research.**

WHAT IS RESEARCH?

Research can be defined as "the search for knowledge or any systematic investigation to establish facts

- "Research comprises creative work undertaken on a systematic basis in order to increase the stock of knowledge, of man, culture and society, and the use of this stock of knowledge to devise new applications." (OECD (2002)
- Research is a systematic attempt to provide answers to questions (Tuckman, 1999).
- Research may be defined as the systematic and objective analysis and recording of controlled observations that may lead to the development of generalizations, principles, or theories, resulting in prediction and possible control of events (Best and Kahn, 1998).
- Research is a systematic way of asking questions, a systematic method of inquiry (Drew, Hardman, and Hart, 1996).

CHARACTERISTICS OF SCIENTIFIC RESEARCH:

A research process is scientific, if it is undertaken within the framework of a set of philosophies (according to the specific field of science), using procedures, methods and techniques that have been tested for their validity and reliability, designed to be unbiased and objective. It is empirical.

- Two main characteristics of scientific method
 - **Validity:** The claim of measuring the identified variable
 - **Reliability:** A repeat of the study should lead to the same outcome; like experiments of Physics or Chemistry.
- A research project has a well-known structure -- a beginning, middle and end.
- The 'control' is the group that serves as the standard of comparison.
- The control group may be a "no treatment" or an "experimenter selected" group.
- Data generated should be analysed for statistical significance.

RESEARCH CLASSIFICATION:

a) BASIC VS. APPLIED RESEARCH

Basic	Applied
<ul style="list-style-type: none"> • Objective -is to contribute to the body of knowledge in an academic domain. • Pure, fundamental research • Discovery of new knowledge; theoretical in nature. <p><i>Eg: research contribution to evolution of universe</i></p>	<ul style="list-style-type: none"> • Objective -is to solve the problem by investigating root causes of that problem. • Improved products or processes • Infers beyond the group or situation studied • Interpretation of results relies upon Basic research. <p><i>Eg: Research suggesting method to improve crop production</i></p>

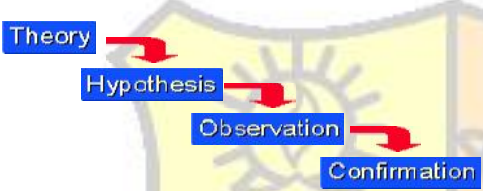
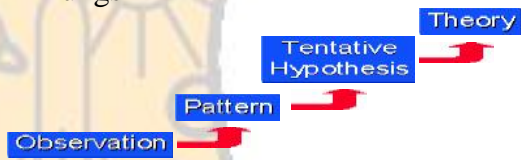
b) QUANTITATIVE VS. QUALITATIVE:

Quantitative	Qualitative
<ul style="list-style-type: none"> • Numerical, measurable data • Traditional or positivist approach • Clearly stated questions • Rational hypotheses • Developed research procedures • Extraneous variable controls • Large samples • Traditional, statistical analyses. <p><i>Eg: Increase in the incidence of HIV infection in the Youth</i></p>	<ul style="list-style-type: none"> • Generally non-numerical data • Typically anthropological and sociological research methods • Observations of a “natural” setting • In-depth descriptions of situations • Interpretive and descriptive <p><i>Eg. Ethics of Youth of today is deteriorating</i></p>

c) EXPERIMENTAL VS. NONEXPERIMENTAL:

Experimental	Nonexperimental
<ul style="list-style-type: none"> • Cause-and-effect • Treatment group and control group present. • Has at least 1 independent and 1 dependent variable. • Involves testing a hypothesis in a controlled environment. • Control - is the group that serves as the standard of comparison. 	<ul style="list-style-type: none"> • Causal-comparative • No treatment group • Descriptive • Correlational • “Epidemiological” Research is usually observational / nonexperimental: • Examples: • Saturated fat intake and heart disease

d) DEDUCTIVE METHOD V/S INDUCTIVE METHOD

Deductive method	Inductive method
<ul style="list-style-type: none"> • In deductive reasoning, thinking proceeds from general assumption to specific application • GENERAL → SPECIFIC • Not sufficient as a source of new truth • Eg. Every mammal has lungs. All rabbits are mammals. Therefore, all rabbits have lungs. 	<ul style="list-style-type: none"> • Conclusions about events (general) are based on information generated through many individual and direct observations (specific). • SPECIFIC → GENERAL • Researchers observe an individual or group of individuals from a larger population → based on these observations, generalizations are made back to the larger population. • Eg: Every rabbit that has been observed has lungs. Therefore, all rabbit have lungs 

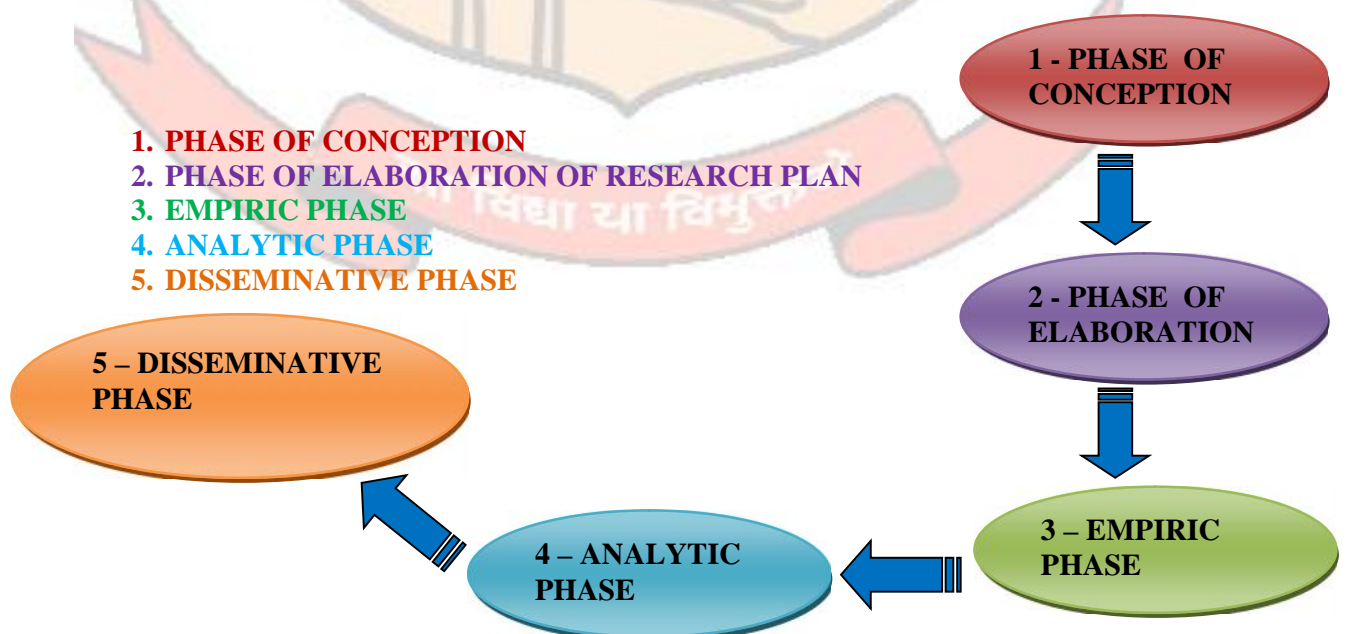
Social Research is research involving social scientific methods, theories and concepts, which can enhance our understanding of the social processes and problems encountered by individuals and groups in society.

SOCIAL SCIENCE RESEARCH CAN ALSO BE:

- Basic – aim is to develop a body of general knowledge
- Applied - aim is to provide knowledge and information that can be used to influence social policy.
- **Theories can be categorized by:**
 - Direction of reasoning (deductive/inductive)
 - Level of social reality that it is explaining (macro/meso/micro)
 - Whether it is formal (general) or substantive (specific).
- **Analytical Research:**
 - Reviews
 - A critical account of present understanding
 - A meta-analysis is a quantitative method of review
 - Historical Research
 - Accessing both primary (e.g. witnesses) or secondary (e.g. literature) sources to document past events
 - Philosophical Research
 - Organising existing evidence into a comprehensive theoretical model
- **Descriptive Research:**
 - Case Study
 - Accrual of detailed information from an *individual*
 - Survey
 - Cross-sectional: Status of a various groups at a given point in time
 - Longitudinal: Status of a given group at various points in time
 - Correlational: Relationships between variables

METHODOLOGICAL APPROACHES / CHOICE OF RESEARCH STRATEGY:

- **Based on Epistemology (How should we be attempting to assess knowledge?)**
 - **Positivism** = explain a phenomena. Interested in causes and predicting likelihood of incidences, seeks to explain, creates social 'facts'.
 - **Interpretivism /critical** = understand a social phenomena in their social context, seeks out structural relationships, data is historical, structural and ideological.
 - **Phenomenology** = Interested in social meanings, seeks to interpret, uses direct involvement, creates data on social interactions.
- **Based on Ontology (Does the data exist in a tangible or an intangible form?)**
 - **Objectivism** = explain independent external outcomes. Phenomena independent of social actors. Organisations and culture are said to exist as a tangible object, external to the social actor.
 - **Constructionism** = understand how social factors interact. Social phenomena and their meanings are continually being accomplished by social actors. Not only produced through social interaction but they are in a constant state of revision.
- Study in the natural sciences often requires a *positivistic epistemology* and an *objectivistic ontology*
- Study in the social sciences often requires an *interpretive epistemology* and a *constructionist ontology*
- However, it is occasionally possible to combine these strategies by coding qualitative data quantitatively (i.e. Athlete = 1 ; Non-Athlete = 2)

PHASES OF RESEARCH

I. PHASE OF CONCEPTION :

- 1st phase of research process in which content and structure of research are created
- Conceptualisation - refers to the process of developing refining abstract ideas. The activities include thinking, rethinking, theorising, making decision, and reviewing ideas.
- It is composed of 4 steps:
 - 1) Formulation and set bounds of research problem, determine the purpose of study
 - 2) Searching and review the literature related to the research problem
 - 3) Development of theoretical construction of the future research
 - 4) Creation of hypothesis
- **1st step : Formulation of research problem:**
 - – accidental observation of phenomenon which we are not able to explain → curiosity
 - – formulation of questions (why and how the phenomenon originated)
 - – considerations on possible cause(es) of the phenomenon
- **2nd step: literature review:**
 - The aim of this step is to find the “older” and current information related to the research problem.
 - Importance of Literature review:
 - It is usually the case that your topic, problem or idea has been previously worked or developed. Don't reinvent the wheel!
 - find the answers to following questions:
 - did anybody formulate the same research problem in the past?
 - did anybody solve the same or similar problem as ours?
 - is the solving of the defined research problem fruitful or not?
 - Use multiple resources like books, online journals, web resources to investigate this and start building your conceptual map about the selected problem.
- **3rd Step: theoretical construction for solving the research problem :**
 - Main aims: Thinking on the content of future research
 - on its timing and structure
 - on the necessary conditions
 - Necessary conditions:
 - the research problem is clearly defined
 - whether facilities are available
 - the main aims are defined
- **4th Step: Formulation of hypothesis:**
 - The hypothesis is what you expect to happen in your experiment. The goal of science is to find an explanation for why the facts are as they are. Such an explanation is a hypothesis.
 - A well-thought-out and focused research question leads directly into hypothesis:
 - Creation of rational assumption on the possible cause(es) of the observed phenomenon.
 - Creation of the questions focused to the essence of the research problem

II. ELABORATION OF RESEARCH PLAN:

- It is a general plan of research:
 - selection of subject - patients, animals, other objects for study.
- for solving the problem
 - creation of representative sample, inclusion,
- exclusion criteria
 - selection of methods

- selection of research technology
- development a protocol of research
- to define the schedule of research
- to define the control methods
- to define the statistical methods
- to define the financial, material and personal

III. EMPIRIC PHASE:

- The aim of this phase is production of results, collection of data, and their preparation for next analysis
- The results are produced by:
 - experimentation on animals
 - by clinical study
 - by using questionnaire, interview, observation
 - by using models - biological, electronic,

IV. ANALYTIC PHASE:

Analyze the results and reach a conclusion

- The content of this phase is:
 - Quantitative analysis of the data
 - Qualitative analysis of the data
 - Statistic analysis of the data
 - interpretation of the results
- Methods used in analytic phase:
- correlation: looking for relationships among the two or more values.
- comparing: comparing the result obtained in your research with similar research done by other researchers.

V. DISSEMINATIVE PHASE:

- It is the phase when results of the research are published as:
 - research report
 - lectures and posters at the conferences
 - papers in journals .



References:

- *Thomas J. R. & Nelson J. K. (2005) Research Methods in Physical Activity, 5th edition. Champaign, Illinois: Human Kinetics*
- *Berg K. E. & Latin R. W. (2008) Essentials of Research Methods in Health, Physical Education, Exercise Science, and Recreation, 3rd edition. Maryland: Lippincott Williams &Wilkins*

