E. Observational research:

An observational research is defined as a type of scientific research in which the subjects are assessed for biomedical or a health outcome without any intervention.

Example: In field studies such as epidemiology, social sciences, psychology and statistics.

Characteristic features:

1. An observational study draws inferences from a sample to a population where the independent variable is not under the control of the researcher.
2. Participants may receive diagnostic, therapeutic or other types of interventions, but the investigator does not assign participants to specific interventions.

F. Interventional Research:

An interventional research is defined as a type of scientific research in which participants are assigned to receive one or more interventions (treatments) so that researchers can evaluate the effects of

the interventions on biomedical or health-related outcomes. It is also called as experimental research.

For Example: Administration of *Tulasi swaras* in *Jwara* and *Pratishyaya*.

G. Mixed research:

Mixed research is defined as a scientific methodology for conducting research that involves collecting, analyzing and integrating quantitative and qualitative data.

Characteristic features:

1. By mixing both quantitative and qualitative data, the researcher gains in depth of knowledge of concepts.
2. One of the most advantageous characteristics of conducting mixed method of research is the possibility of triangulation, i.e., the use of several means (methods, data sources and researchers) to examine the same phenomenon.
3. Mixed research is particularly suited:

a. When one wants to validate or confirm the results obtained from other methods.

b. When one wants to continuously look at a research question from different angles, and clarify unexpected findings and potential contradictions.

c. When one wants to develop a theory about a phenomenon of interest and then test it.

d. When one wants to generalize findings from qualitative research.

Advantages:

- It provides strengths to the weaknesses of both quantitative and qualitative research.
- Provides a more complete and comprehensive understanding of the research problem than either quantitative or qualitative approaches alone.
- Provides an approach for developing better, more specific instruments.
- Helps to explain findings or how causal process work.

Disadvantages and limitations:

- The research design may be very complex.
- Takes more time and resources to plan and implement this type of research.
- It may be difficult to plan and implement one method by drawing on the findings of another.
- It may be unclear, how to resolve discrepancies that arises in the interpretation of findings.

Types of mixed research designs

1. Sequential explanatory design: This design involves the collection and analysis of quantitative data followed by the collection and analysis of qualitative data. It is used to explain, interpret quantitative findings and also to examine in more detail unexpected results from a quantitative study.

Advantages:

- It is easy to implement, because the steps fall into clear separate stages.
- Design is easy to describe and the results are easy to report.

Disadvantages:

- Requires a substantial length of time to complete all data collection given in two separate phases.

Example: The researcher collects data about people's risk and benefit perceptions of red meat using a survey and follows up with interviews with a few individuals who participated in the survey to learn in more detail about their survey responses.

2. Sequential exploratory design: In this design, **collection and analysis of qualitative data is followed by collection and analysis of quantitative data.** Here priority is given to the qualitative aspect of the study.

Uses:

- To explore a phenomenon and to expand qualitative findings.
- To test elements of an emergent theory resulting from the qualitative research.

- To generalize qualitative findings to different samples in order to determine the distribution of a phenomenon within a chosen population.
- To develop and test a new instrument.

Advantages:

- Easy to implement because the steps fall into clear, separate stages.
- The design is easy to describe and the results are easy to report.

Disadvantages:

- It may be difficult to build from the qualitative analysis to the subsequent data collection.

Example: The researcher explores people's beliefs and knowledge regarding nutritional information by starting within store interviews and then uses an analysis of the information to develop a survey instrument that is administered later to a sample from a population.

3. Concurrent triangulation: In this design **only one data collection phase is used during which quantitative and qualitative data collection and analysis are conducted separately and concurrently.** Here equal priority is given to both qualitative and quantitative data.

Uses:

- To develop a more complete understanding of a topic or phenomenon.
- To cross-validate or confirm findings.

Advantages:

- Provides well validated and substantiated findings.
- Compared to sequential designs, data collection takes less time.

Disadvantages:

- Requires great effort and expertise to adequately use two separate methods at the same time.
- It can be difficult to compare the results of two analysis using data of different forms.

- It may be unclear how to resolve discrepancies that arise while comparing the results.
- Given that data collection is conducted concurrently, results of one method (e.g., interview) cannot be integrated in the other method (e.g., survey).

Example: Collecting the information about the pain and its intensity in the form of quality and quantity.

4. Concurrent nested: In this design only one data collection phase is used, during which a predominant method (quantitative or qualitative) over takes the other less priority method (qualitative or quantitative, respectively). The data collected from the two methods are mixed during the analysis phase of the project.

Uses:

- To gain broader and in depth perspectives on a topic.
- To counteract possible weaknesses inherent to the predominant method.

Advantages:

- Both types of data are collected simultaneously.
- It reduces time and resources required for trials.

Disadvantages:

- The data needs to be transformed in some way so that both types of data can be integrated during the analysis, which can be difficult.
- Inequality between different methods may result in unequal evidence within the study.

Example: The researcher collects data to assess people's knowledge and risk perceptions about genetically modified food by using a survey instrument that mixes qualitative (open-ended) and quantitative (closed-ended) questions and both forms of data are integrated and analyzed.

Also the research is classified into:

1. Descriptive research:

Descriptive research is defined as type of research in which, it describes the characteristic features of population and phenomenon

under consideration. Example: Periodic table categories the elements and allows scientist to explain chemical reactions. Physician can give description of upadravas of the disease and line of treatment.

Characters:

1. It has low requirement of internal validity.
2. It is used for frequencies, average and other statistical calculations.
3. It is base for qualitative, explorative, and conceptual research.
4. The results obtained are accurate.

Advantages:

- It includes surveys and fact finding enquiries of different kinds.
- The major purpose of descriptive research is description of the state of affairs as it exists at present.

Disadvantages:

- The main disadvantage of this method is that the researcher has no control over the variables; he can only report what has happened or what is happening.

2. Analytical research:

An analytical research is defined as specific type of research that involves critical thinking, skills and evaluation of facts or information under consideration. On the other hand, the researcher has to use facts or information already available and analyze these to make a critical evaluation of the material. Example: Evaluation of role of *Mridabhakshana* in the manifestation of *Pandu*.

Uses:

1. It is used to quantify performance.
2. It is used to find out most relevant information collected by physician or any research scholars on the selected hypothesis.
3. It is used as supportive research to enrich the data collected by researcher.
4. It is used to threw new light on the topic under study.
5. It is used for literary, scientific trials and public opinion.

3. Fundamental research:

Fundamental research is defined as a type of research which mainly concerned with generalizations and formulation of a theory. "Gathering knowledge for knowledge's sake is termed as 'pure' or 'basic' research."

Example:

i. Research concerning some natural phenomenon or relating to pure mathematics are examples of fundamental research.

ii. Similarly, research studies, concerning human behavior carried on with a view to make generalizations about human behavior.

iii. Basic research is directed towards finding information that has a broad base of applications and thus, adds to the already existing organized body of scientific knowledge.

4. Conceptual research:

Conceptual research is defined as a type of research that mainly deals with some abstract ideas or theory under consideration. It is generally used by philosophers and thinkers to develop new concepts or to reinterpret existing ones. Example: Evaluating the relation between rasa and doshas.

Characteristic features:

The experimenter's has control over the variables under study and his deliberate manipulation of one of them to study its effects.

5. Empirical research:

Empirical research is defined as a type of research which mainly

deals with gaining knowledge by means of direct and indirect observation or experience.

Characteristic features:

1. Empirical evidence can be analyzed quantitatively or qualitatively.
2. Empirical research relies on experience or observation alone.
3. It is data based research, coming up with conclusions.

We can also call it as experimental type of research.

6. One time research:

One time research is a type of research carried out over a single time period. For example - Census study.

7. Longitudinal research:

A longitudinal study is a research design that involves repeated observations of the same variables over periods of time, often many decades. It is a type of observational study, although they can also be structured as longitudinal randomized experiments.

8. Field-setting research:

Field research or fieldwork is the collection of information outside a laboratory, library or work place setting. For example, biologists who conduct field research may simply observe animals interacting with their environments.

9. Laboratory research:

A laboratory research is type of research which provides controlled conditions in which scientific or technological research, experiments and measurement may be performed.

10. Simulation research (Reproduction or model):

Simulation research is defined as tool to help the teacher, evaluator and methodologist to address the complex interaction of data construction, analysis, statistical theory and the violation of key assumptions.

11. Clinical research:

Clinical research is a branch of healthcare science that deter-

mines the safety and effectiveness (efficacy) of medications, devices and such research follow case-study methods or in depth approaches to reach the basic causal relations. Such studies usually go deep into the causes of things or events that interest us, using very small samples and very deep probing data gathering devices.

12. Diagnostic research:

Diagnostic research is defined as type of research which aims to quantify the added value of a test to clinical information that is commonly available before the test will be applied. These may be used for prevention, treatment, diagnosis or for relieving symptoms of a disease.

13. Exploratory research:

Exploratory Research is defined as a type of research conducted for a problem which is not studied more clearly, establishes priorities, develops operational definitions and improves the final research design.

Uses:

1. Exploratory research helps to determine the best research design, data collection method and selection of subjects.
2. The objective of exploratory research is the development of

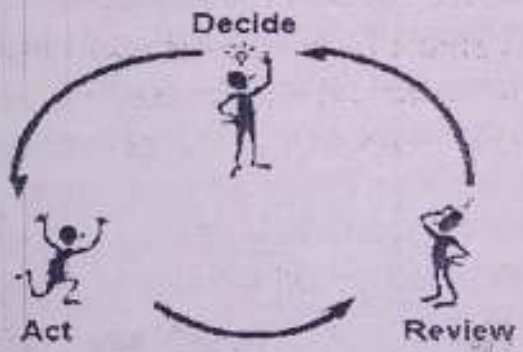
hypotheses rather than their testing, whereas formalized research studies are those with substantial structure and with specific hypotheses to be tested.

14. Historical research:

It is a type of qualitative research, which involves examining past events to draw conclusions and make predictions about the future. The steps in historical research are: formulate an idea, formulate a plan, gather data, analyze data, and analyze the sources of data.

15. Conclusion oriented research:

Conclusion oriented research is defined as a type of research in which a researcher is free to pick up a problem, redesign the enquiry as he proceeds and is prepared to conceptualize as he wishes. ***Decision-oriented*** research is always for the need of a decision maker and the researcher in this case is not free to embark upon research according to his own inclination.



16. Case study research:

Case studies may involve both qualitative and quantitative research methods. Case study should be defined as a research strategy, an empirical inquiry that investigates a phenomenon within its real life context.

Types of case study include the following:

a. **Illustrative case studies:** They typically utilize one or two instances of an event to show the existing situation. Illustrative case studies serve primarily to make the unfamiliar to familiar and to give readers a common language about the topic in question.

b. **Exploratory (Pilot) case studies:** These are condensed case

studies performed before implementing a large scale investigation. Their basic function is to identify questions and select types of measurement prior to the main investigation.

c. **Cumulative case studies:** This study provides the aggregate information from several sites collected at different times. The idea behind these studies is that the collection of past studies will allow for greater generalization without additional cost or time being expended on new, possibly repetitive studies.

d. **Critical instance case studies:** These examine one or more sites either for the purpose of examining a situation of unique interest with little to no interest in generalization, or to call into question a highly generalized or universal assertion. This method is useful for answering cause and effect questions.

❖❖❖