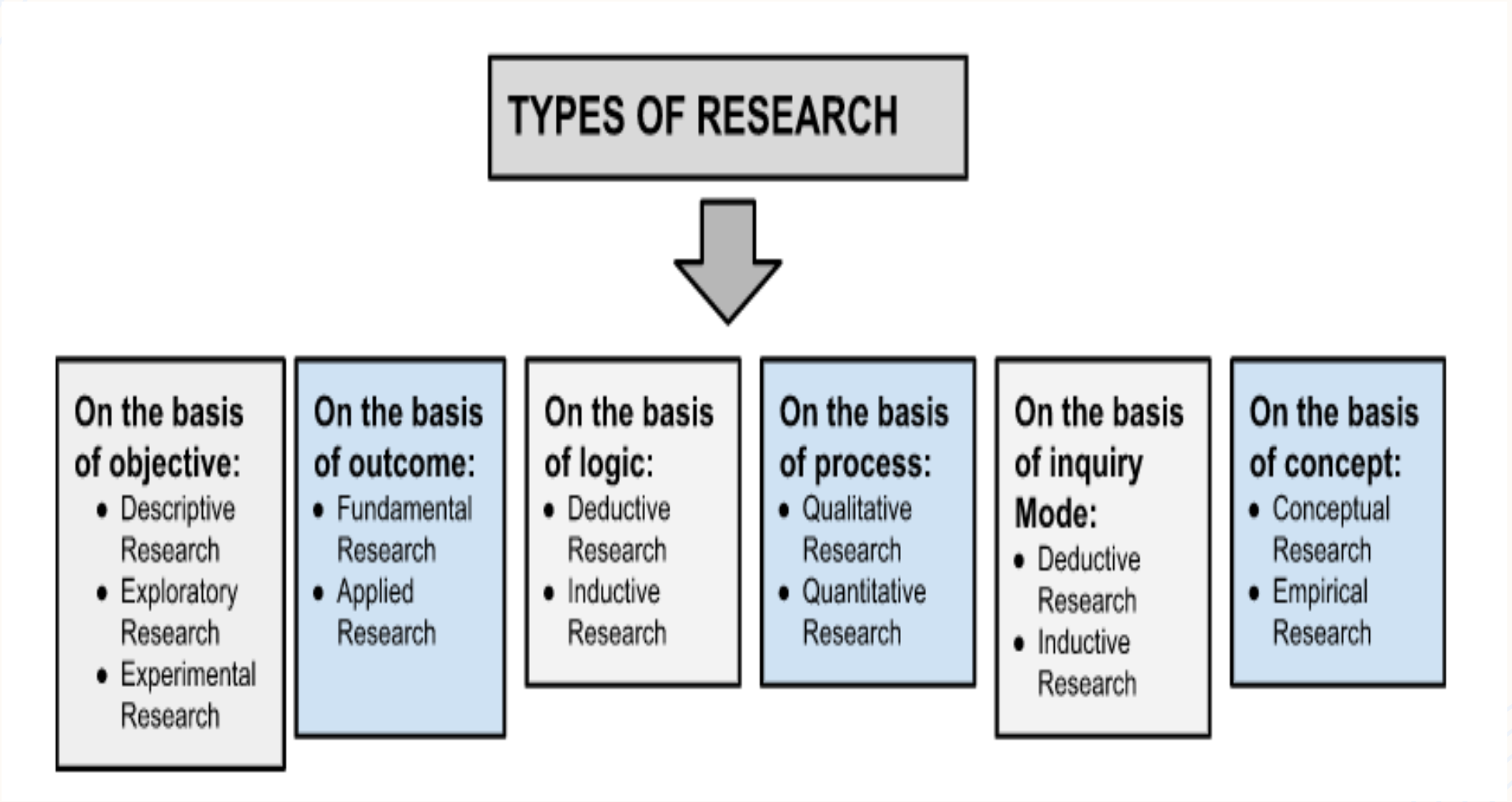
UNIT-2
TYPES OF RESEARCH

AGENDA

1 Pure / Basic / Fundamental Research Vs.

Applied/ Decisional Research

2 Descriptive v/s Analytical


TYPES OF RESEARCH
On the basis of objective:
• Descriptive Research
• Exploratory Research
• Experimental Research
On the basis of outcome:
• Fundamental Research
• Applied Research
On the basis of logic:
• Deductive Research
• Inductive Research
On the basis of process:
• Qualitative Research
• Quantitative Research
On the basis of inquiry Mode:
• Deductive Research
• Inductive Research
On the basis of concept:
• Conceptual Research
• Empirical Research

TYPES OF RESEARCH

- Research can be classified into various categories depending on the perspective under which the research activity is initiated and conducted. The categorization depends on the following perspectives in general:
  - Application of research study
  - Objectives in undertaking the research
  - Inquiry mode employed for research

1 PURE / BASIC / FUNDAMENTAL RESEARCH VS. APPLIED/ DECISIONAL RESEARCH:

1.1 Pure / Basic / Fundamental Research Vs. Applied/ Decisional Research:

Purpose-

Mainly concerned with generalization and with the formulation of theory.

It involves developing and testing theories and hypotheses that are intellectually challenging to the researcher but may or may not have practical application at the present time or in the future.

Pure research is theoretical but has a universal nature. It is more focused on creating scientific knowledge and predictions for further studies.

Example: Study of some natural phenomenon/ relating to pure mathematics, Generalization about human behavior

TYPES OF RESEARCH

Applied/ Decisional Research:

- Purpose- . The purpose of doing such research is to find solutions to an immediate issue, solving a particular problem, developing new technology and look into future advancements etc. This involves forecasting and assumes that the variables shall not change.

Example- Research to identify social ,economics or political trends that may effect a particular institution , marketing research , evolution research.

Key Differences between Basic and Applied Research

a)Basic Research can be explained as research that tries to expand the already existing scientific knowledge base. On the contrary, applied research is used to mean the scientific study that is helpful in solving real-life problems.

b)While basic research is purely theoretical, applied research has a practical approach.

c)The applicability of basic research is greater than the applied research, in the sense that the former is universally applicable whereas the latter can be applied only to the specific problem, for which it was carried out.

d)The primary concern of the basic research is to develop scientific knowledge and predictions. On the other hand, applied research stresses on the development of technology and technique with the help of basic science.

e)The fundamental goal of the basic research is to add some knowledge to the already existing one. Conversely, applied research is directed towards finding a solution to the problem under consideration.

2. DESCRIPTIVE V/S ANALYTICAL:

Descriptive v/s Analytical:

Purpose- The major purpose of descriptive research is description of the state of affairs as it exists at any given time.

The researcher only reports about the factors identified and cannot modify the details available thus it makes it clear that he does not have any control over such variables Most *ex post facto research* projects are used for descriptive studies in which the researcher strives to find out information about, for example, frequency of dining out, preferences of individuals, etc

Descriptive research includes surveys and fact finding enquiries of different kinds..

The term Ex ***post facto research*** is used in social sciences and business research for descriptive research studies.

In ***analytical research,*** 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..

2. DESCRIPTIVE V/S ANALYTICAL:

In ***analytical research,-*** 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.

Unlike descriptive papers, analytical papers look deeper into the subject matter to uncover patterns, relationships, and insights.

For example, analytical research can explore why the value of the Japanese Yen has fallen. This is because analytical research can look at questions of "how" and "why."

Descriptive	Analytical
How many disabled people face social isolation?	What causes social isolation in disabled people?
What is the unemployment rate for disabled people?	Why do disabled people have a harder time finding work?
How many siblings of people with Down syndrome have positive experiences?	Why do so many siblings of people with Down syndrome have positive experiences?

2.DESCRIPTIVE V/S ANALYTICAL:

Key Example Differences between Descriptive v/s Analytical:

Descriptive	Analytical
How many disabled people face social isolation?	What causes social isolation in disabled people?
What is the unemployment rate for disabled people?	Why do disabled people have a harder time finding work?
How many siblings of people with Down syndrome have positive experiences?	Why do so many siblings of people with Down syndrome have positive experiences?

3. CONCEPTUAL VS. EMPIRICAL: CONCEPTUAL RESEARCH

Conceptual research - is associated to some theoretical idea(s) or presupposition and is generally used by philosophers and thinkers to develop new concepts or to get a better understanding of an existing concept in practice.

Empirical research - On the other hand, Empirical research draws together the data based on experience or observation alone, often without due regard for system and theory. It is data-based research, coming up with conclusions which are capable of being verified by observation or experiment.

It is also known as experimental research as it is essential to get facts firsthand, at their source, and actively to go about doing certain things to stimulate the production of desired information.

Here the researcher develops a hypothesis and assimilates certain outcomes to start with followed by efforts to get adequate facts (data) to prove or disprove his hypothesis.

An experimental design is then developed based on variables that can modify or concur the results to prove that he has given a valid statement.

This also affirms that he has a reasonable control over the variables and can get different results by giving different values to them.

Empirical research is appropriate when proof is sought that certain variables affect other variables in some way.

Evidence gathered through experiments or empirical studies is today considered to be the most powerful support possible for a given hypothesis.

DIFFERENCES- CONCEPTUAL VS. EMPIRICAL: CONCEPTUAL RESEARCH

	Conceptual Research	Empirical Research
1)	Similar to Basic Research	Similar to experimental type of research
2)	Related to some abstract idea or theory	Empirical research relies on experience or observation alone
3)	Develop new concepts or to reinterpret the existing ones	Empirical research is appropriate when proof is sought that certain variables affect other variables in some way.
4)	It doesn't involve any practical experimental.	based on experience or observation alone

QUANTITATIVE VS. QUALITATIVE RESEARCH

- Quantitative research is based on the measurement of quantity or amount. It is applicable to phenomena that can be expressed in terms of quantity.
- Qualitative research, on the other hand, is concerned with qualitative phenomenon, i.e., phenomena relating to or involving quality or kind. For instance, when we are interested in investigating the reasons for human behavior (i.e., why people think or do certain things),
- we quite often talk of ‘Motivation Research’, an important type of qualitative research.
- This type of research aims at discovering the underlying motives and desires, using in depth interviews for the purpose. Attitude or opinion research i.e., research designed to find out how people feel or what they think about a particular subject or institution is also qualitative research.
- Qualitative research is specially important in the behavioural sciences where the aim is to discover the underlying motives of human behaviour.

QUANTITATIVE VS. QUALITATIVE RESEARCH

	Qualitative research	Quantitative research
Focus	Exploring ideas or formulating hypotheses/theories	Testing hypotheses or theories
Analysis	Summarizing, categorizing, interpreting	Math and statistical analysis
Expressed in	Words	Numbers, graphs, tables, fewer words
Sample	Few respondents	Many respondents
Questions	Open-ended	Close-ended or multiple choice
Characterized by	Understanding, context, complexity, subjectivity	Testing, measurement, objectivity, replicability

FEATURES OF QUALITATIVE RESEARCH

1. **Naturalistic Inquiry**
Qualitative research is conducted in real-world settings without manipulating variables.
Example: Studying how teachers interact with students in a classroom environment.

2. Focus on Context and Holism
It considers the broader social, cultural, and environmental context of the phenomenon being studied.
Example:
Exploring the influence of cultural norms on gender roles in rural communities.

3. Subjectivity and Researcher Involvement
The researcher becomes a key instrument in collecting and interpreting data, recognizing that their perspectives may influence findings.
Example:
A researcher conducting interviews about mental health acknowledges their biases during the analysis.

FEATURES OF QUALITATIVE RESEARCH

4. Open-Ended and Flexible
Research questions and methods are often open-ended and can evolve during the study to follow emerging insights.
Example:
A study initially focusing on workplace stress may shift to exploring coping mechanisms based on participant responses.

5. Emphasis on Meaning and Interpretation
It seeks to understand the meanings participants assign to their experiences and actions.
Example:
Analyzing how patients describe their journey through a chronic illness to uncover emotional and psychological impacts.

6. Rich and Detailed Data
Data collected is usually in the form of words, images, or narratives, offering depth and complexity.
Example:
Transcripts from interviews that capture the emotions, tone, and exact words of participants.

FEATURES OF QUALITATIVE RESEARCH

7. Use of Non-Standardized Methods
Methods like in-depth interviews, focus groups, and observations are tailored to the research context rather than standardized.
Example:
Using unstructured interviews to explore personal stories of resilience among disaster survivors.

8. Inductive Reasoning
Patterns and theories are developed from the data rather than testing pre-existing hypotheses.
Example:
Identifying themes about work-life balance from interviews with employees.

COMMON METHODS

1. Interviews
2. Focus groups - A **focus group** is a qualitative research method where a **small group of people** (**usually 6–12**) discuss a specific topic, guided by a moderator.

   It helps researchers understand people's **opinions, experiences, and attitudes** on a subject.

COMMON METHODS

1. Interviews
2. Focus groups
3. Ethnography.

Ethnography is a **qualitative research method** used to study **people, cultures, and communities** by observing them in their natural environment. Researchers immerse themselves in the daily lives of the subjects to gain deep insights into their behaviors, traditions, and social interactions.

CASE STUDIES

Case Study 1: Qualitative Research

- **Topic:** Understanding the Emotional Impact of Remote Work on Employees
- **Objective:**
- To explore how remote work has influenced employees' emotional well-being and interpersonal relationships.

METHODOLOGY:

- **Participants:**

20 employees from diverse industries working remotely for over a year.

- **Data Collection:**

Conducted in-depth, semi-structured interviews via Zoom.
Questions focused on personal experiences, challenges, and coping strategies.
Each interview lasted approximately 60 minutes.

- **Analysis:**
- Transcribed interviews were analyzed using thematic analysis.
- Key themes included feelings of isolation, adaptability, and changes in work-life balance

FINDINGS:

- **Theme 1:** Increased isolation and loneliness due to lack of face-to-face interaction.
- **Theme 2:** Improved flexibility leading to higher job satisfaction for some.
- **Theme 3:** Difficulty in setting work-life boundaries causing stress.

CONCLUSION

- The study provided insights into areas where organizations could improve remote work policies, such as fostering virtual team-building activities and offering mental health resources.

METHODS USED IN QUALITATIVE ANALYSIS

- **1. Thematic Analysis**
- **Description:** Identifies, analyzes, and reports patterns (themes) within data.

Example: Understanding shared experiences, such as how employees perceive remote work.

METHODS USED IN QUALITATIVE ANALYSIS

- **2. Grounded Theory**

Develops a theory grounded in the data itself.

Example: Generating theories about social processes (e.g., how people adopt new technology).

METHODS USED IN QUALITATIVE ANALYSIS

- **3. Narrative Analysis**
- Examines stories or accounts to understand how individuals make sense of experiences.

- **Example:**
- A researcher studying **employee experiences in a company** may analyze personal interviews where employees describe workplace challenges. By examining their **choice of words, emotions, and storyline**, the researcher uncovers deeper meanings about organizational culture.

METHODS USED IN QUALITATIVE ANALYSIS

- **4. Content Analysis**

Systematically categorizes textual, visual, or verbal data to identify patterns or trends.

Example: Analyzing social media posts for sentiment or public opinion.

METHODS USED IN QUALITATIVE ANALYSIS

- **5. Ethnographic Analysis**
- Examines cultural or social practices through immersion and observation.

Example: Understanding workplace culture or community traditions.

TOOLS USED IN QUALITATIVE ANALYSIS

- **Software:** NVivo, ATLAS.ti, MAXQDA, Dedoose.
- **Manual Tools:** Coding frameworks, thematic maps, or analytical journals.

FEATURES OF QUANTITATIVE RESEARCH

- **1. Use of Numerical Data**
  Data is collected and expressed in numerical form, such as scores, percentages, or rates.
- **Example:**
  Measuring customer satisfaction on a scale from 1 to 10.

FEATURES OF QUANTITATIVE RESEARCH

- **2. Objective Measurement**
  Quantitative research emphasizes objective and unbiased measurement to ensure reliability and validity.
- **Example:**
  Using standardized test scores to assess student performance.

FEATURES OF QUANTITATIVE RESEARCH

- **3. Hypothesis Testing**
  Research is often guided by a hypothesis that is tested using statistical methods.
- **Example:**
  Testing whether a new drug lowers blood pressure more effectively than a placebo.

FEATURES OF QUANTITATIVE RESEARCH

- **4. Large Sample Sizes**
  Studies often involve large, randomly selected samples to generalize findings to a population.
- **Example:**
  Surveying 1,000 voters to predict election outcomes.

FEATURES OF QUANTITATIVE RESEARCH

- **5. Structured Research Design**
  Research follows a pre-defined structure, including clearly defined variables, research questions, and methodologies.
- **Example:**
  Conducting a pre-test/post-test experimental design to measure changes in knowledge after training.

FEATURES OF QUANTITATIVE RESEARCH

- **6. Statistical Analysis**
  Data is analyzed using statistical techniques to identify trends, correlations, or causal relationships.
- **Example:**
  Performing a regression analysis to predict the impact of advertising spend on sales.

FEATURES OF QUANTITATIVE RESEARCH

- **7. Deductive Approach**
  Research starts with a theory or hypothesis and uses data to test it.
- **Example:**
  Hypothesizing that increased exercise reduces stress and testing it with data from a fitness program.

FEATURES OF QUANTITATIVE RESEARCH

- **8. Use of Instruments**
- Data is collected using structured instruments like surveys, questionnaires, or observation checklists.
- **Example:**
  Administering a Likert-scale survey to measure employee engagement.

METHODS OF QUANTITATIVE ANALYSIS

- **1. Descriptive Statistics**
- Summarizes and describes the characteristics of a dataset.

Example:

- Analyzing demographic information (e.g., age distribution in a population).

METHODS OF QUANTITATIVE ANALYSIS

2. Inferential Statistics

Draws conclusions or inferences about a population based on sample data.

Example:

Testing the effectiveness of a new drug in clinical trials.

METHODS OF QUANTITATIVE ANALYSIS

- **3. Regression Analysis**

Explores relationships between dependent and independent variables.

Example:
Predicting sales based on marketing spend and economic conditions.

METHODS OF QUANTITATIVE ANALYSIS

- 4. Correlation Analysis

Measures the strength and direction of the relationship between two variables.

Example:
Examining the relationship between study time and test scores.

METHODS OF QUANTITATIVE ANALYSIS

5. Hypothesis Testing

Tests a claim about a population parameter.

Example:
Verifying if a new product increases customer satisfaction.

METHODS OF QUANTITATIVE ANALYSIS

6. Structural Equation Modeling (SEM)

Tests complex relationships between variables, often combining regression and factor analysis.

Example:

Understanding the relationship between job satisfaction, performance, and turnover intentions.

TOOLS IN QUANTITATIVE ANALYSIS

- **Software:** SPSS, R, Python, SAS, Excel, MATLAB.
- **Data Visualization Tools:** Tableau, Power BI, Google Data Studi

CASE STUDY 2: QUANTITATIVE RESEARCH

- **Topic:** The Effectiveness of Online Learning Tools in Improving Student Performance

- **Objective:**
- To measure the impact of an interactive learning platform on students' academic performance in mathematics.

METHODOLOGY

- **Participants:**
  - 200 high school students divided into two groups:
    - Experimental group (100 students using the online platform).
    - Control group (100 students using traditional methods).
- **Data Collection:**
  - Pre-test and post-test scores in mathematics were collected over a 6-month period.
  - Surveys assessed students' satisfaction with their learning methods.
- **Analysis:**
  - Statistical methods such as t-tests compared the mean scores between groups.
  - Regression analysis identified factors influencing performance.

- **Findings:**
- The experimental group showed a **15% higher average improvement** in test scores compared to the control group.
- Students using the online platform reported higher engagement and satisfaction levels.
- **Conclusion**
- The results validated the platform's effectiveness and informed decisions about integrating technology into the curriculum.

KEY DIFFERENCES BETWEEN QUALITATIVE AND QUANTITATIVE RESEARCH

Aspect	Qualitative Research	Quantitative Research
Focus	Emotional experiences and themes	Numerical outcomes and statistical relationships
Method	Interviews and thematic analysis	Tests, surveys, and statistical analysis
Outcome	Insights and recommendations	Measurable evidence and validation

MIXED METHOD

- Combination of Quantitative and Qualitative research is mixed method of research.

EXERCISE 1

Understanding Patient Experiences in Healthcare

- **Case Study:** Exploring the Emotional Impact of Cancer Diagnosis

Possible Objective:

Possible Method:

Possible Outcome:

EXERCISE 1

- **Objective:** To understand the psychological and emotional challenges faced by patients after receiving a cancer diagnosis.
- **Method:**
  - Researchers conducted in-depth interviews with 30 cancer patients.
  - Focused on their initial reactions, coping mechanisms, and support system needs.
  - Data was analyzed using **thematic analysis** to identify common emotional responses (fear, hope, resilience).
- **Outcome:**
  - Findings highlighted the need for early emotional counseling and peer support groups, influencing hospital policies to include these services.

EXERCISE 2

- Healthcare: Effectiveness of Vaccines
- **Case Study:** Assessing the Impact of COVID-19 Vaccines on Infection Rates

EXERCISE 2

- **Objective:**

To determine the effectiveness of COVID-19 vaccines in reducing infection rates and severe outcomes.

- **Methodology:**

Sample: Over 1 million vaccinated and unvaccinated individuals.

- **Data Collection:**
  - Medical records were analyzed for infection, hospitalization, and mortality rates over 6 months.
  - A control group of unvaccinated individuals matched by age, gender, and health sta

Statistical Analysis: Logistic regression was used to calculate the odds ratio of infection in vaccinated vs. unvaccinated groups.

EXERCISE 2

- **Findings:**
- Vaccines reduced infection rates by **60%** and severe outcomes by **85%.**
- Results were statistically significant, with a p-value < 0.01.

- **Outcome:**
- The study informed public health campaigns and vaccine distribution strategies.

EXERCISES

- **Investigating Workplace Diversity and Inclusion**

Experiences of Women in Leadership Roles

- **Community Development and Urban Planning**

Understanding Resident Perceptions of Gentrification

- **Education: Impact of Technology in Classrooms**

Evaluating the Effect of Tablets on Student Learning Outcomes

EXERCISES

- **Marketing: Customer Behavior Analysis**

The Effectiveness of Discount Offers on Purchase Behavior

- **Exploring Social Media Usage Among Teenagers**

The Impact of Instagram on Self-Esteem

EXERCISES

- **Understanding Cultural Practices**

Traditional Healing Practices in Rural Communities

- **Sports: Performance Analysis**

Effect of Altitude Training on Athlete Endurance

- **Environmental Science: Air Pollution Monitoring**

Correlation Between Traffic Volume and Air Quality

OTHER TYPES OF RESEARCH

1.one-time research or longitudinal research.

In the former case the research is confined to a single time-period, whereas in the latter case the research is carried on over several time-periods.

2. Field-setting research or Laboratory research or simulation research- Dedepending upon the environment in which it is to be carried out.

3. clinical or diagnostic research.

Such research follow case-study methods or indepth 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.

TYPES OF RESEARCH

4.The research may be exploratory or it may be formalized.

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.

5. Historical research

- which utilizes historical sources like documents, remains, etc. to study events or ideas of the past, including the philosophy of persons and groups at any remote point of time.

6 Conclusion-oriented and Decision-oriented.

In conclusion oriented research, 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.

Operations research is an example of decision oriented research since it is a scientific method of providing executive departments with a quantitative basis for decisions regarding operations under their control

TYPES OF RESEARCH

- **"Performance Enhancement of Cache"** would primarily fall under the following categories:
  1. **Applied Research** – Since it focuses on improving the efficiency of cache memory, which has practical applications in computing and system performance.
  2. **Experimental Research** – If you are conducting simulations, testing new caching algorithms, or benchmarking different cache configurations.
  3. **Analytical Research** – If you are analyzing existing cache mechanisms, evaluating their performance, and deriving new insights.
  4. **Quantitative Research** – Since cache performance can be measured using metrics like hit rate, miss rate, latency, and execution time.
- If our research involves proposing a **new algorithm** or **optimization technique**, it may also be categorized under **innovative or exploratory research**.

TYPES OF RESEARCH

- Research is often **multifaceted** and can belong to multiple categories depending on its objectives, methodology, and approach.
- In your case, the **performance enhancement of cache** research involves:
- **Applied Research** (since it aims at improving real-world system performance)
- **Experimental Research** (if testing and benchmarking are involved)
- **Analytical Research** (if evaluating existing cache mechanisms)
- **Quantitative Research** (since performance metrics are measured)

THEMATIC ANALYSIS

- **Example:**
- A researcher wants to study **students' experiences with online learning.** They conduct interviews and collect responses like:
- "I feel isolated because I miss classroom interaction."
- "Online classes are convenient but sometimes distracting."
- "Technical issues make learning difficult."
- After analyzing the data, the researcher **groups similar responses** into themes:
- **Lack of social interaction**
- **Convenience and flexibility**
- **Technical challenges**
- These themes help understand students' common experiences and suggest improvements for online education.

FOCUS GROUPS METHOD

- **Example:**
- A company launching a **new mobile app** wants to understand user preferences. They conduct a focus group with **10 potential users**, asking:
- What features do you like in an app?
- What problems do you face with existing apps?
- How can this app improve your experience?
- By listening to the discussion, the company gets valuable insights to **improve the app** before its final release.

ETHNOGRAPHY

- **Example:**
- A researcher wants to study the **lifestyle of a remote tribal community**. Instead of just interviewing people, they **live with the tribe for six months**, observing:
- How they hunt and gather food
- Their traditional rituals and festivals
- Family structures and social roles
- This immersive approach helps the researcher **understand the culture from an insider's perspective**, rather than relying only on external observations.

THANK YOU

Dr. Sanju Gupta
sanjug@sies.edu.in