

**GAUHATI UNIVERSITY**  
**Centre for Distance and Online Education**

**EDU-4026**

**M.A. Fourth Semester**  
**(Under CBCS)**

**EDUCATION**

**Paper: EDU 4026**  
**METHODOLOGY OF EDUCATIONAL**  
**RESEARCH**



**Contents:**

- Block- I : Educational Research**
- Block- II : Review of Related Literature**
- Block- III : Research Design**
- Block- IV : Qualitative and Quantitative Data Analysis**
- Block- V : Research Report**

---

**SLM Development Team:**

---

**Head,** Department of Education, G.U.

**Programme Coordinator,** MA in Education, GUCDOE

**Dr. Manoj Nayak,** Assistant Professor, GUCDOE

---

**Course Coordination:**

---

**Dr. Debahari Talukdar** Director, GUCDOE

**Prof. Purabi Baishya** Programme Coordinator, GUCDOE,

**Dr. Manoj Nayak** Assistant Professor, GUCDOE

**Dipankar Saikia** Editor SLM, GUCDOE

---

**Contributors:**

---

**Dr. Hamiya Gohain** (Block- I)

Assistant Professor, Dept. of Education  
Chaiduar College

**Dr. Poli Phukan** (Block- II)

Teaching Associate, Dept. of Education  
Gauhati University

**Dr. Archana Adhikari** (Block- III: Units- 1 & 2)

Assistant Professor, Dept. of Education  
KKHSOU

**Mr. Hridayananda Borah** (Block- III: Units- 3, 4 & 5)

Assistant Professor, Dept. of Education  
North Guwahati College

**Taslina Nasrin** (Block- IV)

Assistant Professor, GUCDOE

**Dr. Manoj Nayak** (Block- V)

Assistant Professor, GUCDOE

---

**Cover Page Design & Type Setting:**

---

**Bhaskar Jyoti Goswami** GUCDOE

**Nishanta Das** GUCDOE

**ISBN: 978-81-995225-5-8**

**April, 2026**

© Copyright by GUCDOE. All rights reserved. No part of this work may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, or otherwise.  
Published on behalf of Gauhati University Centre for Distance and Online Education by the Director, and printed at Gauhati University Press, Guwahati-781014.

## **CONTENTS:**

### **Block- I: Educational Research**

**(Page: 04-100)**

- Unit 1 : Meaning, Nature, Steps, Significance and Scope of Educational Research
- Unit 2 : Types of Research: Basic/Fundamental Research, Applied and Action Research
- Unit 3 : Historical Method of Educational Research – Nature, Purpose, Types
- Unit 4 : The Descriptive Method of Educational Research –Nature, Value, Types and Steps
- Unit 5 : The Experimental Method of Educational Research –Nature and Steps

### **Block- II: Review of Related Literature**

**(Page: 101-137)**

- Unit 1 : Review of Related Literature- Purpose, Steps Involved in Review of Related Literature
- Unit 2 : Identification of Review of Literature
- Unit 3 : Organizing the Related Literature
- Unit 4 : Ethical Issues in Social Research

### **Block- III: Research Design**

**(Page: 138-240)**

- Unit 1 : Design of the Study- Population
- Unit 2 : Sampling- Meaning, Nature and Types of Sampling
- Unit 3 : Representative vs. Random Sampling
- Unit 4 : Sample Size, Random Sampling Errors and its Importance for Drawing Inferences
- Unit 5 : Tools of Educational Research

### **Block- IV: Qualitative and Quantitative Data Analysis**

**(Page: 241-306)**

- Unit 1 : Qualitative Research - Meaning, Concept, Characteristics
- Unit 2 : Quantitative Research - Meaning, Concept, Characteristics
- Unit 3 : Differences between Qualitative and Quantitative Research
- Unit 4 : Qualitative Data Analysis
- Unit 5 : Quantitative Data Analysis

### **Block- V: Research Report**

**(Page: 307-318)**

- Unit 1 : The Research Report

**BLOCK: 1**

**EDUCATIONAL RESEARCH**

**Unit 1: Meaning, Nature, Steps, Significance and Scope of Educational Research**

**Unit 2: Types of Research: Basic/Fundamental Research, Applied and Action Research**

**Unit 3: Historical Method of Educational Research – Nature, Purpose, Types**

**Unit 4: The Descriptive Method of Educational Research –Nature, Value, Types and Steps**

**Unit 5: The Experimental Method of Educational Research –Nature and Steps**

**UNIT- 1**  
**MEANING, NATURE, STEPS, SIGNIFICANCE AND SCOPE**  
**OF EDUCATIONAL RESEARCH**

**Unit Structure:**

- 1.1 Introduction
- 1.2 Objectives
- 1.3 Meaning of Research
- 1.4 Definition of Research
- 1.5 Objective of Research
- 1.6 Meaning of Educational Research
- 1.7 Definition of Educational Research
- 1.8 Characteristics of Educational Research
- 1.9 Objectives of Educational Research
- 1.10 Steps of Educational Research
- 1.11 Significance of Educational Research
- 1.12 Scope of Educational Research
- 1.13 Summing Up
- 1.14 Answer to Self Asking Questions
- 1.15 References and Suggested Readings

**1.1. INTRODUCTION:**

Education is an ongoing and lifelong journey designed to foster positive changes in human behaviour through impactful learning opportunities. It not only provides knowledge and skills but also molds attitudes, values, and abilities that help individuals adjust to the evolving demands of society. For education to effectively fulfil its goals, it must be informed by scientific insights rather than assumptions or trial-and-error approaches. This is where structured and logical inquiry, often known as research, plays a crucial role. Research is a deliberate and unbiased pursuit of new knowledge and understanding that aids in identifying issues, confirming existing information, and uncovering innovative solutions. In the realm of

education, research is crucial for enhancing the teaching and learning experience, increasing the effectiveness of educational initiatives, and establishing a strong basis for the development of policies. It provides teachers with data-driven insights that inform classroom strategies, assist in creating innovative teaching techniques, and propose remedies for ongoing academic and administrative issues. By improving the quality and efficiency of education, educational research plays a significant role in the comprehensive development of students and the advancement of society.

## **1.2. OBJECTIVES:**

After going through this unit you will be able to-

- *discuss* the meaning, nature, steps of educational research;
- *know* the meaning, definition, characteristics, significance and scope of educational research.

## **1.3 MEANING OF RESEARCH:**

The word research originates from the French word “recherche”, meaning “to search again” or “to investigate thoroughly.” Research is fundamentally a structured, scientific, and logical form of inquiry conducted to uncover new facts, confirm existing knowledge, or create new interpretations. It is not simply casual observation or the haphazard gathering of information; instead, it requires planned, organized, and systematic efforts to investigate the unknown or address a particular problem. Research is distinguished by analytical thinking, meticulous observation, precise data collection, and objective evaluation, ultimately resulting in the development of valid conclusions. In practical terms, research is a progression from the known to the unknown. It starts with recognizing a problem or question, goes on to the gathering and evaluation of data, and culminates in the interpretation of findings to achieve new insights.

For instance, a researcher might examine how various teaching techniques influence student learning results or explore the factors leading to a decrease in students' academic

achievements. In every situation, the objective of research is to deepen understanding, address challenges, and contribute to the growth of knowledge in a specific area.

Therefore, research can be described as an ongoing and evolving quest for truth, driven by evidence rather than beliefs. It serves as the foundation of advancement in every field, including education, as it offers a scientific basis for decision-making, policy development, and the enhancement of practices.

#### **1.4 DEFINITIONS OF RESEARCH:**

To clearly understand the concept and nature of research, it is important to examine how various scholars and experts have defined it. Research is generally considered a systematic and scientific investigation carried out to discover new facts, verify existing knowledge, and develop theories or principles. Below are 10 widely accepted definitions of research:

- 1. Clifford Woody (1927):** “Research comprises defining and redefining problems, formulating hypotheses or suggested solutions; collecting, organizing and evaluating data; making deductions and reaching conclusions; and at last, carefully testing the conclusions to determine whether they fit the formulated hypothesis.” Explanation: Emphasizes the systematic process of research from problem identification to hypothesis testing.
- 2. C. R. Kothari (2004):** “Research is a scientific and systematic search for pertinent information on a specific topic.” Explanation: Highlights that research is scientific, systematic and information-oriented.
- 3. Kerlinger (1973):** “Research is a systematic, controlled, empirical and critical investigation of natural phenomena guided by theory and hypotheses about the presumed relations among such phenomena.” Explanation: Stresses the controlled, empirical, and theory-driven nature of research.
- 4. Best (1983):** “Research is considered 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.” Explanation: Focuses on objectivity and generalization to predict and control phenomena.

5. **John W. Creswell (2014):** “Research is a process of steps used to collect and analyze information to increase our understanding of a topic or issue.” Explanation: Points to the step-by-step process and knowledge-building purpose of research.
6. **Charles F. M. (1960):** “Research is an honest, exhaustive, intelligent searching for facts and their meanings or implications with reference to a given problem.” Explanation: Stresses honesty, thoroughness, and meaningful interpretation in research.
7. **Whitney (1960):** “Research is a systematic search for facts and knowledge.” Explanation: A simple and concise definition emphasizing systematic investigation for knowledge acquisition.
8. **Slesinger & Stephenson (1930):** Research is the manipulation of things, concepts, or symbols for the purpose of generalizing to extend, correct, or verify knowledge.” Explanation: Focuses on expanding or verifying existing knowledge through research.
9. **P. M. Cook (1935):** “Research is an honest, exhaustive, and intelligent search for facts and their meanings or implications with reference to a given problem.” Explanation: Similar to Charles F. M., emphasizing intelligence, honesty, and meaningful interpretation.
10. **Fred Kerlinger (1986):** “Research is a systematic investigation to find answers to a problem.” Explanation: A concise, problem-focused definition highlighting the investigative nature of research.

From these definitions, research can be summarized as:

- Systematic and scientific investigation.
- Problem-oriented and evidence-based.
- Aimed at discovering new facts, verifying existing knowledge, or developing theories.
- A process involving data collection, analysis, interpretation, and conclusion

### **1.5 OBJECTIVES OF RESEARCH:**

The purpose of research is to discover answers to questions through the application of scientific procedures. The main aim of research is to find out the truth which is hidden and which has not been discovered as yet. Though each research study has its own specific

purpose, we may think of research objectives as falling into a number of following broad groupings:

1. To gain familiarity with a phenomenon or to achieve new insights into it (studies with this object in view are termed as exploratory or formulative research studies).
2. To portray accurately the characteristics of a particular individual, situation or a group (studies with this object in view are known as descriptive research studies).
3. To determine the frequency with which something occurs or with which it is associated with something else (studies with this object in view are known as diagnostic research studies);
4. To test a hypothesis of a causal relationship between variables (such studies are known as hypothesis-testing research studies).

#### **STOP TO CONSIDER**

- Research is a systematic and scientific process of collecting, analyzing, and interpreting information to answer questions or solve problems. It involves careful investigation based on observation, experimentation, and logical reasoning. Research aims at discovering new facts, verifying existing knowledge, and establishing relationships between variables. It is an organized inquiry that follows specific steps to ensure accuracy, objectivity, and reliability of findings.
- Research is scientific in nature because it follows a structured and logical procedure. It is systematic, meaning it progresses step by step according to a planned design. Research is empirical as it is based on observation and evidence rather than personal opinion.
- The primary objective of research is to discover new knowledge and expand the existing body of knowledge. It aims to verify and test facts and theories. Research seeks to establish cause-and-effect relationships between variables. Another objective is to solve practical problems and improve existing practices. It also aims to develop new tools, techniques, and theories for better understanding of phenomena.

### **Self Assessment Questions**

Q.1. What is a systematic search for new knowledge?

Q.2. Research is a \_\_\_\_\_ process of investigation.(Fill in the blank)

Q.3. A temporary assumption in research is called a \_\_\_\_\_.(Fill in the blank)

Q.4. What type of data is based on observation and experience?

Q.5. What is the detailed plan of research called?

### **1.6 MEANING OF EDUCATIONAL RESEARCH:**

Educational research is the organized and scientific examination of educational challenges aimed at enhancing teaching and learning processes, educational practices, and overall educational achievements. It entails utilizing research principles and methodologies to investigate topics related to students, educators, curricula, instructional techniques, assessment methods, and the operations of educational institutions. In contrast to general research, which may investigate natural phenomena or social behaviors, educational research specifically addresses issues within the domain of education, striving to offer practical and theoretical insights for its advancement.

The fundamental concept of educational research is to comprehend, clarify, and enhance the educational experience. It may include:

- Examining student learning behaviors to pinpoint elements that promote or obstruct learning.
- Assessing the efficacy of teaching strategies, learning materials, or evaluation methods.
- Investigating the influence of the school environment, administration, and teacher performance on achieving educational objectives.
- Creating new methods, strategies, or programs to tackle challenges within the classroom and institution.

Educational research is grounded with evidence-based and problem-based. For instance, a teacher might investigate the reasons behind students' lack of interest in science classes,

while a policymaker may initiate a study on the effects of digital learning tools in rural education settings. Both examples exemplify educational research, as they involve methodical exploration aimed at discovering solutions that can enhance educational outcomes.

Fundamentally, educational research serves as a link between educational theory and real-world application. It enables teachers and administrators to make well-informed choices, improves the quality of teaching and curriculum, and plays a role in shaping policies and fostering innovation in the education field. In the absence of research, education would depend solely on tradition or conjecture; however, with research, it evolves into a scientific, adaptive, and responsive discipline that meets the needs of society.

### **1.7 DEFINITIONS OF EDUCATIONAL RESEARCH:**

- 1. Good (1959):** “Educational research is the systematic application of scientific methods to the study of educational problems.” Explanation: This definition emphasizes that educational research is systematic and scientific, focusing specifically on problems in education.
- 2. Best (1983):** “Educational research is that activity which is directed towards the development of a science of behaviour in educational situations.” Explanation: This stresses the behavioural aspect of education, such as student learning, teacher performance, and classroom interactions.
- 3. Travers (1978):** “Educational research is the activity for the development of a science of behaviour in educational situations.” Explanation: Similar to Best, Travers highlights that educational research studies human behavior in an educational context to create scientific understanding.
- 4. Carter V. Good:** “Educational research is the systematic study of educational problems using the scientific method for their solution.” Explanation: This focuses on problem-solving in education using scientific methods like observation, experimentation, and data analysis.
- 5. Whitney (1960):** “Educational research is the study and investigation in the field of education to solve problems and to improve educational practice.” Explanation: Whitney points out that research is practical and improvement-oriented, targeting better educational outcomes.

6. **Wiersma (1991):** “Educational research is the scientific approach for answering questions about educational settings, processes, and outcomes.” Explanation: This emphasizes questioning and inquiry, covering all aspects of education including inputs, processes, and results.
7. **Ary, Jacobs & Razavieh (1996):** “Educational research is the application of scientific procedures to the study of educational problems.” Explanation: This definition reinforces the scientific procedure as the backbone of educational research.
8. **Mouly (1978):** “Educational research is the systematic application of scientific methods for solving educational problems and for development of educational theory.” Explanation: This highlights both problem-solving and theory-building, showing that research serves practical and academic purposes.
9. **Kerlinger (1973):** “Educational research is a systematic, controlled, empirical, and critical investigation of propositions about the relationships among phenomena related to educational situations.” Explanation: Kerlinger underlines that research should be empirical, critical, and based on observable facts, focusing on relationships among educational variables.
10. **Borg and Gall (1989):** “Educational research is the formal, systematic application of the scientific method to the study of educational problems.” Explanation: This concise definition emphasizes that research is formal, organized, and scientific, avoiding guesswork or personal opinions.

From the above definitions, the key aspects of educational research can be summarized as:

- It is systematic, scientific and evidence-based.
- It focuses on educational problems, processes and improvements.
- It studies behavior and relationships in educational settings.
- It aims at solving problems, improving practice and developing theory.
- It serves as a bridge between theory and practice in the field of education.

## **1.8 CHARACTERISTICS OF EDUCATIONAL RESEARCH:**

### **1. Systematic and Organized Process:**

Educational research adheres to a structured procedure that begins with identifying the

problem, establishing objectives and hypotheses, gathering data, analyzing it, and ultimately arriving at conclusions. This methodical arrangement guarantees that the results are trustworthy and valid. For instance, a study aimed at assessing the impact of activity-based learning on students' performance will start by recognizing the issue, outlining objectives, creating a methodology, collecting data, and interpreting the findings accordingly.

## **2. Scientific in Nature:**

Educational research adheres to the guidelines of the scientific method. It is based on observation, experimentation, and empirical evidence rather than conjecture or subjective opinions. For instance, when examining the effects of digital classrooms, researchers gather and evaluate actual data instead of depending on assumptions.

## **3. Problem-Oriented:**

Educational research typically begins with an issue encountered in the education sector, like low student achievement, elevated dropout rates, or inefficient teaching approaches. For instance, a teacher investigating the reasons behind students' declining interest in mathematics is engaging in problem-focused research.

## **4. Empirical and Evidence-Based:**

The results of educational studies rely on observable and quantifiable data rather than individual viewpoints or instincts. For instance, gathering test scores and attendance logs can help assess the impact of morning study sessions on students' academic performance.

## **5. Objective and Unbiased:**

Conducting educational research demands that the researcher maintains impartiality and is devoid of personal biases, prejudices, or emotional influences. For instance, if a researcher favors traditional teaching but still assesses digital approaches fairly based on evidence, the research remains objective.

## **6. Analytical and Logical:**

It requires critical thinking, data analysis, and logical reasoning to arrive at sound conclusions. Statistical methods are frequently employed to logically interpret the results. For

instance: Utilizing correlation analysis to assess the connection between studying habits and academic performance.

### **7. Replicable and Verifiable:**

A robust educational research study should be able to be replicated by other researchers under comparable conditions to confirm its conclusions. For example: If research on the effectiveness of peer tutoring in English is conducted at another school and yields similar outcomes, the study is considered replicable.

### **8. Aims at Generalization and Prediction:**

Educational research frequently establishes general principles or connections that can be utilized in comparable educational contexts. It may also forecast trends or outcomes. For instance, a study investigating the link between parental engagement and student success can aid in anticipating future performance patterns.

### **9. Ethical in Conduct:**

Educational research adheres to ethical standards, which include ensuring confidentiality, being truthful and equitable, and preventing harm to participants. For instance, a researcher is prohibited from revealing individual student test scores without obtaining permission..

### **10. Practical and Utility-Oriented:**

The primary goal of educational research is to enhance educational practices. Its results should be beneficial to educators, school leaders, and policymakers. For instance, research proposing innovative methods to decrease absenteeism can have a direct positive impact on schools.

### **11. Continuous and Ongoing Process:**

Investigating educational issues is an ongoing process since they continuously change. Each piece of research can pave the way for additional inquiries. For instance, examining the success of online learning during the COVID-19 pandemic might result in new research focusing on blended learning approaches.

### **12. Interdisciplinary in Nature:**

Educational research frequently incorporates elements from psychology, sociology, economics, statistics, and technology, as education is affected by various factors. For

instance, a study examining the impact of socioeconomic status on student achievement utilizes both educational and social research methodologies. In summary, educational research is structured, empirical, pragmatic, and focused on problem-solving. These attributes ensure that the findings are valid, dependable, and relevant in actual educational environments. By following these guidelines, educational research lays the groundwork for enhancing educational theory, practice, and policy.

## **1.9 OBJECTIVES OF EDUCATIONAL RESEARCH:**

The main aim of educational research is to enhance the teaching and learning experience, address educational challenges, and aid in the advancement of educational theory and practice. Each research study is carried out with a specific aim that directs the choice of topic, methods, and analysis of findings. The goals of educational research can be separated into theoretical (knowledge enhancement) and practical (problem resolution) purposes.

### **1. To Identify Educational Problems:**

The primary goal of educational research is to identify and clarify issues encountered in classrooms, schools, or the education system. For instance, determining the factors contributing to limited reading comprehension in Class VIII students.

### **2. To Improve the Teaching-Learning Process:**

The goal of research is to discover improved approaches to teaching and learning by evaluating different methods, strategies, and materials. For instance, examining if project-based learning enhances science performance in comparison to traditional lectures.

### **3. To Discover New Knowledge or Facts:**

Educational research aims to produce new understandings and concepts that enhance the theoretical basis of education. For instance, a study investigating how social media influences students' motivation for academic achievement. Research is also carried out to tackle pressing, practical challenges that educators and school leaders encounter. For example, implementing action research to mitigate classroom discipline problems through positive reinforcement strategies.

### **4. To Solve Classroom and School Problems:**

Educational research aims to produce new understandings and concepts that enhance the

theoretical basis of education. For instance, a study investigating how social media influences students' motivation for academic achievement. Research is also carried out to tackle pressing, practical challenges that educators and school leaders encounter. For example, implementing action research to mitigate classroom discipline problems through positive reinforcement strategies.

#### **5. To Evaluate Educational Programs and Policies:**

Research in education is essential for evaluating the success of curricula, teaching strategies, educational reforms, and policies. For instance, assessing how well the National Education Policy (NEP) 2020 has been implemented in secondary schools.

#### **6. To Improve Educational Planning and Administration:**

Studies offer data and insights that assist administrators in making decisions, allocating resources, and planning effectively. For instance, investigating the impact of teacher-student ratios on school performance can guide staffing arrangements.

#### **7. To Promote Innovation in Education:**

A key goal is to create and evaluate new methods, resources, or approaches to improve educational results. For instance: Assessing how gamification impacts the learning of mathematics.

#### **8. To Understand Learner Behaviour and Psychology:**

Research aids in understanding the attitudes, interests, skills, and motivations of learners to improve their performance. For instance, exploring the connection between study habits and academic success among high school students.

#### **9. To Predict Educational Trends and Outcomes:**

Through the examination of patterns and connections, research in education can anticipate future trends or student performance indicators. For instance, estimating dropout rates by considering attendance and the socio-economic backgrounds of students.

#### **10. To Improve Teacher Effectiveness:**

The objective of research is to pinpoint characteristics and tactics that enhance teaching efficacy. For instance, examining how reflective teaching methods elevate teachers' performance in the classroom.

### **11. To Contribute to Theory Formation in Education:**

Research in education also creates overarching principles and theories that can direct future practices and investigations. For example, constructing a theory regarding the connection between collaborative learning and critical thinking.

### **12. To Enhance the Overall Quality of Education:**

The primary aim is to enhance the quality of education, benefiting students, educators, institutions, and the community. For instance, studies on incorporating ICT tools in rural schools aim to close the digital gap.

In short, educational research is focused on achieving specific goals and is practical in nature. It aims to pinpoint issues, enhance teaching methods, encourage innovation, and develop new insights. By fulfilling these goals, educational research ensures that education remains vibrant, grounded in evidence, and attuned to the needs of society.

## **1.10 STEPS OF EDUCATIONAL RESEARCH:**

Research methodology refers to the systematic plan used to conduct research in a scientific and logical manner. The major steps are as follows:

### **1. Identification of the Research Problem:**

The initial step is to explicitly outline the issue to be investigated. A clearly outlined issue guides the research and establishes its boundaries.

### **2. Review of Related Literature:**

A review of current studies, literature, journals, reports, and theses is conducted to comprehend the existing work, pinpoint areas that require further research, and prevent any overlap in research efforts.

### **3. Formulation of Objectives and Hypotheses:**

Clear objectives are established to direct the research. In empirical investigations, hypotheses are created for testing purposes, while in qualitative or philosophical studies, research questions are developed to provide guidance.

#### **4. Research Design:**

The researcher determines the overall design of the study—whether it will be descriptive, experimental, historical, philosophical, or exploratory—as well as the techniques for data collection and analysis.

#### **5. Selection of Sample:**

The target population is defined, and a suitable sampling method (such as random, stratified, or purposive) is employed to choose a representative sample.

#### **6. Tools and Techniques of Data Collection:**

Appropriate instruments like surveys, interviews, observation frameworks, assessments, or document evaluations are chosen or created.

#### **7. Collection of Data:**

Data is gathered in a systematic manner while adhering to ethical standards to guarantee precision, dependability, and validity.

#### **8. Analysis and Interpretation of Data:**

The gathered data is examined through qualitative or quantitative methods and understood in the context of the research aims and hypotheses.

#### **9. Findings and Conclusions:**

Key results are outlined, conclusions are formulated, and the study's implications are explored.

#### **10. Report Writing:**

The study is presented in an organized manner, comprising sections such as introduction, methodology, analysis, findings, conclusions, and references.

### **1.11 SIGNIFICANCE OF EDUCATIONAL RESEARCH:**

Research methodology plays a vital role in ensuring the quality and credibility of research. Its significance includes:

- 1. Provides Scientific Validity:** It guarantees that research is performed in a structured, rational, and unbiased manner.

2. **Guides the Research Process:** A well-defined methodology serves as a guide, allowing the researcher to move forward systematically without any uncertainty.
3. **Ensures Reliability and Accuracy:** Effective techniques reduce mistakes and prejudices, resulting in reliable outcomes.
4. **Facilitates Replication and Verification:** A clearly defined methodology enables other researchers to reproduce or confirm the study.
5. **Enhances Ethical Research Practices:** It encourages ethical principles like informed consent, confidentiality, and responsible management of data.
6. **Improves Decision-Making and Policy Formulation:** Studies that utilize sound methodology offer trustworthy evidence for choices in academic, social, and policy decisions.
7. **Contributes to Knowledge Development:** Well-structured research contributes to the current body of knowledge and propels the field forward.

### 1.12 SCOPE OF EDUCATIONAL RESEARCH:

The field of educational research can be classified into the following categories:

(i) **Educational psychology:** Researchers in this area assist educators in gaining insight into the children within the classroom to enhance the teaching-learning experience. This research provides the following insights:

- The impact of socio-cultural factors on the growth of children
- The applicability of learning theories across different educational contexts.
- The comparative effectiveness of various learning theories through field experiments.
- Identification of factors that facilitate learning.
- The influence of physical and intellectual challenges on the learning process.
- An understanding of children's personalities in the classroom.
- The effects of parents' and teachers' attitudes towards children on their learning.
- Awareness of the challenges faced by physically and socially disadvantaged children in the school environment.
- The role of educators and textbooks in addressing delinquency among adults.

**(ii) Philosophy of education:** Research in this field can provide us the following information:

- The significance of logic across different fields of education, from conceptual information to theoretical development.
- The impact of knowledge, beliefs, and values in shaping educational theories.
- The influence of ideologies and religion in enhancing educational practices.
- The formulation of a practical philosophy within the Indian context.
- Uncovering new insights from ancient Indian philosophies applicable to today's circumstances.
- Assessing the contributions of various Indian philosophers and their relevance in the present day.
- The restructuring of the social framework and educational system in India.

**(iii) Sociology of education:** Various dimensions of research in this field are given below:

- Impact of shifts in demographic composition on education.
- Influence of the New Education Policy (1986, 1992) on the growth of education and job opportunities.
- Contribution of educational institutions to societal change and the reciprocal relationship with society.
- Influence of social and cultural aspects in promoting social and educational equality.
- Teachers' role as catalysts for social change, modernization, and equity in society.
- Education for marginalized groups within society.
- Issues faced by minority groups.
- Effects of the reservation policy on the social framework.

**(iv) Educational management and administration:** Research in this field can help us understand the following aspects:

- The challenges faced by educational administration in India and their effect on student performance.

- The influence of educational planning and legislation on student outcomes.
- The evolution of management theories and their significance for educational institutions.
- The role of educators and school leaders in improving student performance.
- The influence of hiring policies on educational results.
- The relationship between supervision and performance.
- The role of non-governmental organizations in the field of education.
- The consequences of liberalization and privatization in higher education in India.

(v) **Comparative education:** Research in this field helps us understand the following aspects of education:

- The administrative and educational policies of various nations and their effects on society as a whole.
- The influence of different educational systems around the globe on one another.
- A comparison of the educational advancements in multiple countries worldwide.
- The effect of economic development on education.
- The distribution of education budgets in different nations and its influence on educational progression.

(vi) **Curriculum development:** Nature and scope of research in this field can be understood by the following topics:

- Framework of the educational curriculum in India from elementary to tertiary levels
- Examination of the psychological requirements of students at various educational stages.
- Evaluation and arrangement of the curriculum across different subjects
- Curriculum in connection to the needs of students and society
- Review of textbooks at various learning stages
- Upgrading the curriculum to address evolving needs

- Fostering national values through curriculum enhancement

**(vii) Guidance and counselling:** Research in this field helps us to understand the following aspects of education:

- The importance of family and community in helping children acclimate to societal norms
- Development of tools for assessing students' adjustment challenges
- Approaches to vocational guidance for children from various social backgrounds
- Recognition of elements that lead to students' success in life
- Modification of international tests and surveys for applicability in Indian contexts

**(viii) Educational technology:** Research in this field contributes in the:

- Creation of innovative teaching methods through action research
- The impact of technology on the teaching and learning process
- Utilization of psychological principles to address educational challenges
- Implementation of tech tools and regulations in education
- Advancement of new audio-visual resources

**(ix) Problems of Indian education:** This research covers:

- Pre-primary education
- Primary education
- Secondary education
- Higher education
- Vocational and technical education
- Non-formal education
- Distance education
- Recommendations of commissions and committees on education
- Continuous and comprehensive evaluation
- Value education

- Women's education
- Inclusive education
- Teacher education

(x) **Inclusive education:** Physical handicaps can be genetic or acquired. From diagnosis to their rehabilitation, we come across a number of problems that are to be investigated scientifically to arrive at a definite solution.

#### **Self Assessment Questions**

- Q.6.** What is educational research?  
**Q.7.** What is the nature of educational research?  
**Q.8.** What is the basis of educational research?  
**Q.9.** What is collected in educational research?  
**Q.10.** What is analyzed in educational research?  
**Q.11.** What is the foundation of educational research?  
**Q.12.** What is the approach used in educational research?

### **1.13 Summing Up**

- Research is a systematic and scientific process of investigating a problem in order to discover new knowledge or verify existing facts. It involves careful observation, collection of data, analysis, and interpretation to reach valid conclusions. Research is not merely gathering information; it is a structured inquiry guided by logical reasoning and evidence. The main aim of research is to find solutions to problems and to contribute to the development of knowledge in a particular field.
- Research is systematic, objective, logical, and empirical in nature. It follows a definite sequence of steps such as problem identification, hypothesis formulation, data collection, analysis, and conclusion. Research is based on observable evidence rather than personal opinion. It is replicable, meaning that other researchers can repeat the study and obtain similar results. Research is also analytical because it involves critical examination and interpretation of data to draw meaningful conclusions.

- The primary objective of research is to discover new facts and verify existing knowledge. It aims to identify relationships between variables, test hypotheses, and develop theories. Research also helps in solving practical problems and improving existing practices. Another important objective is prediction and control of events or phenomena. Ultimately, research contributes to the advancement of knowledge and societal development.
- The scope of research is very wide and extends to all disciplines such as science, social science, education, medicine, commerce, and technology. Research can be theoretical or applied in nature. It includes various methods like experimental, descriptive, historical, and survey research. Research may focus on individuals, groups, institutions, or societies. Thus, the scope of research covers all areas where systematic investigation is needed to solve problems or generate knowledge.
- Educational research refers to the systematic study of problems related to education. It involves scientific investigation of teaching methods, learning processes, curriculum, administration, and educational policies. The purpose of educational research is to improve the quality of education by developing better techniques, strategies, and policies. It helps educators understand learners' behavior and improve teaching-learning outcomes.
- Educational research is scientific, systematic, and practical in nature. It is concerned with solving educational problems and improving educational practices. It may be quantitative, qualitative, or mixed in approach. Educational research is interdisciplinary because it draws knowledge from psychology, sociology, philosophy, and statistics. It is also dynamic, as it adapts to changes in society and educational needs.
- The main objective of educational research is to improve teaching and learning processes. It aims to develop effective instructional methods, evaluate curriculum, and enhance student achievement. Educational research also seeks to solve classroom problems and guide educational policy decisions. Another objective is to develop new theories and models in education. It ultimately contributes to the overall development of learners and the education system.

- The experimental method follows a systematic sequence of steps. First, the researcher identifies and clearly defines the research problem. Next, a hypothesis is formulated to predict the relationship between variables. The researcher then selects and defines the independent, dependent, and control variables. After this, an appropriate experimental design is prepared, and a suitable sample is selected, often using random assignment to form experimental and control groups. The experiment is conducted by administering treatment to the experimental group while keeping the control group unaffected. Data is collected carefully and analyzed using statistical methods.

**Check Your Progress:**

Q.1. Write the characteristics of Dynamic and progressive methods of teaching in Continuing Education.

Q.2. What are the different methods used in teaching people how to read?

Q.3. What is teaching techniques? Write the need and importance of techniques of teaching.

**1.14 Answer to Self Assessment Questions:**

Answer to Q. No.1: Research

Answer to Q. No.2: Systematic

Answer to Q. No.3: Hypothesis

Answer to Q. No.4: Empirical

Answer to Q. No.5: Design

Answer to Q. No.6: Investigation

Answer to Q. No.7: Scientific

Answer to Q. No.8: Evidence

Answer to Q. No.9: Data

Answer to Q. No.10: Information

Answer to Q. No.11: Observation

Answer to Q. No.12: Systematic

### 1.15 References and Suggested Readings:

- Johnson, R. Burke and Larry Christensen. 2014. *Educational Research: Quantitative, Qualitative and Mixed Approaches* (Fifth Ed.).USA: SAGE Publication.
- Koul, Lokesh. 2009. *Methodology of Educational Research* (FourthEd.). New Delhi: Vikas Publishing House.
- Chawla, D. and N. Sondhi. 2011. *Research Methodology*. New Delhi: Vikas Publishing House.
- Kothari, C.R.2008. *Research Methodology*. New Delhi: New Age Publishers. Kumar, B. 2006. *Research Methodology*. New Delhi: Excel Books.
- Paneerselvam, R. 2009. *Research Methodology*. New Delhi: Prentice Hall of India.
- Payne, Geoff and Judy Payne. 2004. *Key Concepts in Social Research*. London: SAGE Publications.
- Ahuja, M.K., K.A. Chudoba and C.J. Kacmar. 2007. 'IT Road Warriors: Balancing Work–family Conflict, Job Autonomy and Work Over load to Mitigate Turnover Intentions.' *MIS Quarterly* 31(1): 1–17.
- Yegidis, B. and R.Weinback.1991. *Research Methods for Social Workers*. New York: Longman.
- Yussefi, Mand H Miller. 2002. *OrganicAgriculture World Wide 2002, Statistics and Future Prospects*. International Federation of Organic Agriculture Movements.Germany.
- Zikmund, William G. 1997. *Business Research Methods*. 5th edn. Bengaluru: Thompson South-Western.

## UNIT- 2

### TYPES OF RESEARCH: BASIC/FUNDAMENTAL RESEARCH, APPLIED AND ACTION RESEARCH

#### Unit Structure:

2.1 Introduction

2.2 Objectives

2.3 Types of Educational Research

2.3.1 Fundamental Research

2.3.2 Applied Research

2.3.3 Action Research

2.4 Comparison of the three types of Educational Research

2.5 Summing Up

2.6 Answer to Self Asking Questions

2.7 References and Suggested Readings

#### 2.1 INTRODUCTION:

Research involves a systematic and scientific approach to gathering, analyzing, and interpreting information to enhance knowledge or address issues. Within the field of education, research contributes to comprehending teaching and learning processes, refining educational practices, and formulating new theories and approaches.

Educational research is typically categorized into three primary types based on its objectives and applications: Fundamental (Basic) Research, Applied Research, and Action Research. Fundamental research seeks to generate new knowledge and theories without a focus on immediate practical application. Applied research concentrates on addressing specific educational challenges and enhancing practices. Action research is undertaken by educators

or practitioners aimed at fostering immediate improvements in classroom dynamics and institutional operations.

Therefore, various research types fulfill distinct roles, ranging from developing theories to addressing practical issues and facilitating prompt enhancements.

## **2.2 OBJECTIVES:**

After going through this unit you will be able to

- *discuss* about various types of educational research;
- *know* the meaning and significance of different types of educational research.

## **2.3 TYPES OF EDUCATIONAL RESEARCH**

Educational research can be categorized in several ways, influenced by aspects such as the study's objective, the chosen methodology, and the characteristics of the research issue. Of these classifications, the one based on the study's intent is regarded as the most commonly recognized and useful. This method emphasizes the goals of the research, whether it seeks to create new insights, address specific educational challenges, or promote prompt enhancements in teaching practices. Under this classification, educational research is generally divided into three major types:

1. Fundamental research
2. Applied research
3. Action research

Each type has a distinct objective, approach, and contribution to education.

### **2.3.1 FUNDAMENTAL RESEARCH:**

Basic research, often referred to as fundamental or pure research, is a category of inquiry that primarily seeks to increase knowledge without any immediate or practical intention. Its primary goal is to investigate the core principles, theories, and laws that influence various phenomena. Fundamental research is centered on uncovering new information and creating new theories that enhance the overall knowledge framework within a particular discipline.

In the realm of education, fundamental research aims to improve the theoretical comprehension of teaching, learning, and human behavior instead of addressing a specific issue in the classroom. For instance, exploring the cognitive mechanisms involved in learning or examining the effect of motivation on memory exemplifies fundamental research. Several scholars have defined fundamental research as follows:

1. **Kerlinger (1973):** “Fundamental research is the research conducted to gain more comprehensive knowledge or understanding of the subject under study without specific applications in mind.”
2. **Best & Kahn (2006):** “Basic or fundamental research seeks to discover new knowledge and to advance the general frontiers of knowledge without the immediate purpose of applying it to practical problems.”
3. **Travers (1978):** “Fundamental research is designed to add to an organized body of scientific knowledge and does not necessarily produce results of immediate practical value.”
4. **Good (1972):** “Basic research is that type of research which is primarily concerned with the formulation of a theory or with gaining new knowledge for the sake of knowledge itself.”
5. **Cohen & Manion (1994):** “Fundamental research contributes to the development of theory by attempting to discover general principles or laws.”

The main characteristics or features of fundamental research are:

1. **Knowledge-Centric:** The main goal is to create new knowledge instead of addressing immediate challenges.
2. **Theoretical Focus:** It emphasizes the formation of theories, models, and principles rather than practical uses.
3. **Lacks Immediate Practicality:** The findings may not have direct practical significance at the moment of discovery, but they could prove valuable over time.
4. **Aims for Generalization:** Fundamental research strives to establish universal principles that can clarify phenomena across different contexts.
5. **Exploratory and Analytical Approach:** It investigates uncharted territories and

examines relationships between variables to enhance scientific comprehension.

6. **Basis for Applied Research:** The knowledge acquired through fundamental research frequently acts as a foundation for applied research and practical advancements.
7. **Long-Term Impact:** Though it may not provide immediate solutions, its findings can significantly influence future studies, policies, and applications.
8. **Rooted in the Scientific Method:** Basic research adheres closely to the scientific method, ensuring a structured approach that includes observation, hypothesis development, experimentation, and drawing conclusions.
9. **Performed in Regulated Environments:** The majority of basic research is carried out in labs or controlled settings to minimize the influence of external variables.
10. **Enhancement of Knowledge:** Its primary aim is to contribute to the existing knowledge framework within a specific field of study.

**Example:**

- A study on the relationship between memory retention and learning styles among adolescents.
- Research on cognitive development stages in school children.

Although fundamental research may not solve immediate problems, it provides a strong theoretical foundation for applied and action research.

### **2.3.2 APPLIED RESEARCH**

Applied research generally denotes a systematic and scientific methodology used to explore real-world problems with the key objective of identifying practical and immediate solutions. In contrast to fundamental or basic research, which mainly aims to broaden knowledge or formulate theories without a focus on practical application, applied research is oriented towards action and centered on problem-solving. It leverages established principles, concepts, and theories derived from basic research and utilize them to address issues encountered in daily life, industries, organizations, or social contexts. For example, studies aimed at formulating a new medication for a particular illness, increasing agricultural yield, optimizing machine performance, or devising traffic management solutions are all instances of applied research. The primary objective of this type of research is to connect theoretical

concepts with practical applications, making the findings immediately advantageous for society, businesses, or any specific sector facing the challenge.

In education, applied research is crucial for addressing practical challenges and enhancing educational methods. It emphasizes the implementation of educational theories, principles, and discoveries in tangible classroom or school contexts. The main objective is to improve teaching, learning, and administrative effectiveness by tackling particular problems encountered by educators, students, and educational organizations. For instance, applied research might include assessing the effectiveness of an innovative teaching strategy, examining the effects of digital learning resources on student achievement, enhancing classroom management approaches, or evaluating the results of a new assessment system. This type of research is focused on action, providing immediate solutions that can be adopted in educational institutions. It aids in connecting educational theories established through fundamental research with their practical use in actual educational environments, ultimately supporting the overall advancement of the educational system. Applied research has been defined by various scholars to emphasize its practical and problem-solving nature. Some notable definitions are:

1. **Good (1959):** “Applied research is undertaken to solve an immediate, practical problem of the modern world, rather than to acquire knowledge for knowledge’s sake.”
2. **Ary, Jacobs, and Sorensen (2010):** “Applied research is directed toward the solution of specific, practical problems and the improvement of practice.”
3. **Kerlinger (1973):** “Applied research is research directed towards the solution of specific practical problems in real-life situations.”
4. **Best and Kahn (2006):** “Applied research aims at finding a solution for an immediate problem facing a society or an industrial/business organization.”
5. **Cohen, Manion, and Morrison (2007):** “Applied research seeks to solve practical problems through the application of scientific methods and principles.”
6. **Travers (1969):** “Applied research in education is concerned with the application and testing of theoretical concepts and the development of principles that can be immediately applied in practice.

These definitions highlight that applied research is purposeful, goal-oriented, and focuses on bridging the gap between theoretical knowledge and its real-life application.

Some important characteristics of applied research are as follows:

**1. Practical Orientation:**

Applied research is fundamentally practical, concentrating on solving real-world issues rather than exploring theoretical or abstract ideas. Its main objective is to create viable solutions that can be applied to enhance current practices, systems, or conditions. For example, applied research in education might aim to create innovative classroom management techniques or develop an effective curriculum to address the pressing challenges encountered by teachers and students.

**2. Goal-Directed:**

Applied research focuses on specific goals, as it is carried out with a defined aim. The process begins by pinpointing what requires enhancement or resolution and then moves forward to accomplish that goal. For instance, research aimed at boosting student engagement in online education or alleviating traffic congestion in cities demonstrates the purpose-driven aspect of applied research. Application of Theories

One of the key features of applied research is that it draws upon theories, models, and principles established by basic research and applies them in practical situations. Instead of generating new theories, applied research tests and uses existing knowledge to find solutions. For instance, psychological learning theories can be applied to develop effective teaching strategies in classrooms.

**3. Immediate Utility:**

Applied research yields results that are directly applicable and immediately useful in addressing issues. In contrast to basic research, which may offer long-term advantages, applied research guarantees that its outcomes can be quickly utilized to drive improvements. For instance, research focused on minimizing stress in the workplace offers instant recommendations for employers to improve employee well-being.

**4. Empirical Nature:**

Applied research is grounded in empirical evidence, which means that conclusions are drawn from observations, experiments, and systematic data gathering rather than from assumptions. The scientific method guarantees the validity and reliability of the results, rendering the

outcomes practical and dependable. For instance, evaluating the effectiveness of a new teaching method necessitates gathering and analyzing data from actual classrooms.

#### **5. Context-Specific:**

Applied research tends to be contextual since it is conducted in real-life environments where the issue naturally arises, like in schools, hospitals, industries, or communities. This approach that is specific to the context enables researchers to grasp the practical circumstances and limitations while offering solutions that are workable and relevant to that particular setting.

#### **6. Problem-Solving Approach:**

The essence of applied research is its focus on solving problems. It starts with recognizing and articulating a specific issue, then moves on to explore the underlying causes, assess the circumstances, and suggest remedies. For instance, an educational researcher might begin by pinpointing elevated dropout rates among students and subsequently carry out applied research to create strategies aimed at lowering those rates.

#### **7. Evaluative Component:**

Applied research frequently includes evaluation and assessment to assess the effectiveness or efficiency of various methods, programs, or interventions. It not only offers solutions but also evaluates the results to confirm that the suggested solution leads to real improvements. For instance, a researcher might examine the effects of a digital learning program to determine if it boosts student performance.

#### **8. Modifies and Improves Practice:**

A key aspect of applied research is its role in enhancing or refining current methods and strategies. By pinpointing shortcomings and proposing alternatives, applied research fosters ongoing development and innovation. For example, a company might utilize applied research to enhance manufacturing processes, leading to increased efficiency and improved product quality.

#### **9. Combination of Theory and Practice:**

Applied research serves to connect theoretical insights with practical use. It converts abstract ideas, principles, and discoveries from fundamental research into effective solutions that tackle real-world issues. This combination guarantees that knowledge extends beyond academic confines and fosters tangible progress in society.

**Example:**

- Research on effectiveness of group discussion vs. lecture method in teaching history.
- Evaluating the impact of digital classrooms on student engagement.

Applied research bridges the gap between theory and practice, turning theoretical knowledge into practical solutions for schools and classrooms.

**STOP TO CONSIDER**

- Fundamental research, also known as basic or pure research, is conducted to develop new knowledge and theories without immediate practical application. Its main aim is to discover general principles and expand the existing body of knowledge in education. It focuses on understanding underlying concepts, relationships, and laws that govern educational phenomena. Fundamental research is theoretical in nature and forms the foundation for applied research. It contributes to the development of educational theories and models.
- Applied research is conducted to solve practical problems in educational settings. It uses the knowledge and theories developed through fundamental research to address real-life issues in schools, classrooms, and educational institutions. The main objective of applied research is to improve teaching methods, curriculum, evaluation techniques, and administrative practices. It is problem-oriented and directly related to practical application. Applied research helps in policy formulation and decision-making in education.

**Self Assessment Questions**

- Q.1.** What is another name for fundamental research?
- Q.2.** What is the nature of fundamental research?
- Q.3.** What is the main aim of fundamental research?
- Q.4.** What is the main focus of applied research?
- Q.5.** What does applied research aim to improve?
- Q.6.** What type of issues does applied research address?

### 2.3.3 ACTION RESEARCH:

Action research is a unique type of research aimed primarily at resolving immediate issues and enhancing practices. In contrast to traditional research, which typically seeks to develop universal theories or expand the overall body of knowledge, action research is practical and specifically tailored to its context. It is conducted by the very practitioners, such as teachers, administrators, or other professionals, who are engaged in the environment where the problem occurs. The fundamental concept of action research is that those directly experiencing the challenge are the most qualified to explore it and implement suitable solutions.

In the realm of education, action research is crucial for enhancing teaching and learning experiences. For instance, a teacher might observe that students are having difficulty with a certain topic or that there is a lack of engagement in the classroom. By conducting action research, the teacher methodically identifies the issue, formulates an intervention or strategy to tackle it, applies the strategy in class, monitors the results, and reflects on the findings to assess its effectiveness. This thoughtful and hands-on method not only aids in resolving the current classroom challenge but also boosts the teacher's professional skills.

Action research is marked by its cyclical structure, where the phases of planning, acting, observing, and reflecting are reiterated as necessary until the intended enhancement is reached. This ongoing cycle enables practitioners to adjust their methods based on data and experiences. Additionally, it is a collaborative process, as it frequently includes partnerships among practitioners or stakeholders who aim for a shared goal of improvement.

The core of action research revolves around the integration of both research and action. It enables professionals to thoughtfully examine their own practices, explore new methods, and make changes that foster significant enhancements in their work settings. By addressing pressing, real-world issues, action research connects theory with practice, ensuring that the insights acquired are directly applicable and valuable in a practical sense.

Some important definitions of Action research are as follows:

1. **Stephen M. Corey (1953):** “Action research is the process by which practitioners attempt to study their problems scientifically in order to guide, correct and evaluate their decisions and actions.”
2. **Kurt Lewin (1946):** “Action research is a type of research aimed at the resolution of immediate problems of a local nature, undertaken by those who are directly involved with the problem.”

3. **John W. Best (1983):** “Action research is focused on the immediate application, not on the development of theory or on generalizations of findings.”
4. **Cohen and Manion (1985):** “Action research is a small-scale intervention in the functioning of the real world and a close examination of the effects of such an intervention.”
5. **Kemmis and McTaggart (1988):** “Action research is a form of collective self-reflective inquiry undertaken by participants in social situations to improve the rationality and justice of their own practices.”
6. **Hopkins (2002):** “Action research is an act undertaken by teachers to study their own teaching and their students’ learning with the aim of improving both.”

Some important characteristics of action research are as follows:

**1. Problem-Oriented:**

Concentrates on addressing particular, practical, and urgent issues within a local framework instead of developing universal theories.

**2. Action-Oriented:**

Entails implementing measures to solve an issue and analyzing the results of those measures.

**3. Cyclical Process:**

Engages in a recurring process of strategizing, executing, monitoring, and reviewing to consistently enhance the circumstances.

**4. Participatory Nature:**

Involves active participation of practitioners (e.g., teachers, administrators) who are directly concerned with the problem.

**5. Situational and Context-Specific:**

Solutions are tailored for particular circumstances and may not be applicable in all scenarios.

**6. Reflective Practice:**

Promotes introspection among practitioners to assess the impact of their actions and gain insights from their experiences.

**7. Collaborative in Nature:**

Frequently entails collaboration among professionals, researchers, or interested parties to address common challenges.

## **8. Improvement-Focused:**

The main objective is to foster beneficial changes and enhancements in practices or results.

## **9. Flexible and Adaptive:**

Action research can be adjusted according to the findings and understanding acquired throughout the process.

## **10. Combination of Research and Practice:**

It bridges the gap between theory and practice by applying research methods to real-life problems.

### **➤ Scope of Action Research:**

The range of action research is quite extensive. Professionals engaged in education who wish to enhance any element of the educational system can find this research extremely beneficial. For instance, if a teacher aims to elevate the quality of their teaching, they can utilize this research for support. Similarly, if an educational administrator seeks to implement changes within education administration, they too can benefit from action research.

To summarize, when it comes to specific issues or when new elements are integrated into an existing system and their effects need to be assessed, the action research approach can be applied. It is also important to note that during the action research process; there should be an effective method in place to measure the research's advancement. Below are several fields in which action research can be implemented in educational settings:

- 1. Use of modern methods in education:** Analyzing the reasonableness of employing contemporary approaches like project-based learning, discovery techniques, and adaptive instruction methods in place of conventional methods.
- 2. Use of teaching materials:** What kinds of instructional materials are suitable for different circumstances?
- 3. Evaluation methods:** Enhancing ongoing and comprehensive assessment.
- 4. Attitudes and values:** Fostering a constructive outlook on work and cultivating student values.

5. **Teacher professional development:** Enhancing instructional abilities, refining pedagogical techniques, cultivating analytical thinking, increasing self-awareness, etc.
6. **Control and management:** Employing techniques for behavior modification.
7. **Administration:** Enhancing efficiency within the school's administrative sector.

➤ **Need and Importance of Action Research:**

The extraordinary growth of education at every level in our country has resulted in a rise in the number of students and teachers in schools, which has introduced a range of challenges. Educators are encountering various difficulties, such as overcrowded classrooms and schools with only one teacher. In addition to this, issues are emerging in the implementation of new innovations in the education sector, including programmed instruction, institutional planning, hands-on experience, computer-assisted learning, and team teaching. With the increasing numbers, there is an urgent need for research to uphold quality standards. Action research is crucial for addressing issues related to school organization, administration, and various administrative challenges.

Apart from this, some features of prescriptive research are of special significance in the field of education. For example-

- Immediate or prescriptive research highlights the preferred decentralization of decision-making and operational procedures.
- Both researchers and educators involved in the field seek to gain a deeper understanding of their profession.
- This study provides the educator with fresh interests, motivation, and perspectives that inspire and support them in their teaching journey.

➤ **Steps of Action Research:**

Action research is conducted through the following stages.

In the **first stage**, the problem is identified, evaluated, and defined based on everyday learning. It should remain flexible so the school can add new ideas or changes when needed.

In the **second phase**, preliminary conversations take place among those involved or interested in the study, including educators, researchers, advisors, and so forth, leading to the creation of a draft project. At this point, researchers can articulate their insights regarding the particular facet of the study. This phase is crucial as the outcome of the research heavily relies on the effective execution of this phase.

In the **third stage**, Literature Review (examination or analysis of prior research) aims to gather information regarding the methodologies employed in earlier studies analogous to the current research, what challenges were encountered, how these issues were addressed, etc.

In the **fourth level**, the issue examined in the first level is elaborated upon if needed, and the objective is explicitly articulated. At this stage, the hypothesis or project is developed. At this level, hypotheses pertinent to the issue are constructed

In the **fifth level**, the research techniques are detailed. Choices are made regarding sampling or group selection, identification of data collection techniques, execution methods, funding grants, personnel selection etc.

At the **sixth level**, the assessment approach is established, along with the consideration of ongoing evaluation

At the **seventh level**, the research project is executed (for a defined duration). This encompasses different conditions and approaches to displaying data. (researcher gathering, data archiving, preliminary report, conclusive report, team assessment report, subsequent tasks, input to the research team, categorization, data examination, etc.)

The **eighth level** is the final level. At this level, the importance of the examined data is detailed, and the overall project is assessed. A comprehensive overview of all the activities in the research is released, and suggestions are provided following the evaluation of the results achieved. Essential steps are implemented to notify all relevant stakeholders about the suggestions.

### **Advantages of Action Research:**

The advantages of action research are mentioned below-

1. If a person is interested in solving a problem, he can take the help of this research from the very beginning.

2. Prescriptive research emphasizes the intended decentralization in the field and in decision-making.
3. This type of research helps in increasing the knowledge of the individual and is able to gain the appreciation of everyone. It opens the door to a new world for the researcher.
4. To provide adequate guidance to students, the teacher, as an educator, must acquire knowledge through research. Currently, the focus is on structuring advanced instructional techniques and teaching via problem-solving rather than on memorization. The instructor will aim to assist the students in developing skills through scientific methods. In addition to this, it is essential to draw in exceptionally talented students for future research. One cannot engage in field work without obtaining adequate knowledge regarding research. Counter-regulatory studies serve a valuable purpose in this context.
5. Research generates fresh interests among teachers, fosters new motivations, aids in gaining insights and developing perspectives, and in stills doubt regarding conventional methods. Gaining new knowledge and consistently honing professional skills enhances the teacher's development while also boosting their self-confidence, prompting them to implement it in the classroom.

### **Disadvantages of Action Research:**

It is considered low-quality research. Because most teachers do not have knowledge of research methods and lack training. According to George G. Mauley, Action Research is one blind man leading another blind man. Since teachers are very close to the problem and are not trained in scientific impersonality, the problem is further increased.

Since there is no universal validity, its results cannot be applied to any other class or school. Sometimes this type of research acts as an overburden for teachers.

### **Example:**

- A teacher investigates why students are inattentive in class and tests strategies like interactive games to improve attention.
- A principal studies ways to reduce absenteeism through motivational programs.

Action research empowers educators to take charge of their professional growth and improve the learning environment in real time.

**STOP TO CONSIDER**

- Action research is a small-scale, practical research conducted by teachers or practitioners to solve immediate classroom problems. It focuses on improving teaching-learning processes and finding solutions to local issues. Action research is cyclical in nature, involving planning, action, observation, and reflection. It is participatory and directly linked to classroom practice. The main aim of action research is immediate improvement rather than theory building.

**Self Asking Questions**

- Q.7. What is the nature of action research?
- Q.8. What is solved through action research?
- Q.9. What is the scale of action research?
- Q.10. What cycle does action research follow?
- Q.11. What is improved through action research?
- Q.12. What is the main aim of action research?

**2.4 COMPARISON OF THE THREE TYPES OF EDUCATIONAL RESEARCH:**

<b>Basis of Comparison</b>	<b>Fundamental Research (Basic Research)</b>	<b>Applied Research</b>	<b>Action Research</b>
<b>Meaning</b>	Research conducted to develop theories, principles, or general knowledge without immediate practical use.	Research conducted to solve specific, practical educational problems.	Research carried out by teachers or practitioners to improve their own classroom or institutional practices.

<b>Purpose</b>	To expand knowledge and understanding of educational phenomena.	To find solutions to real-life educational issues.	To bring immediate improvement in teaching–learning situations.
<b>Nature</b>	Theoretical and conceptual.	Practical and problem-oriented.	Practical, localized, and reflective.
<b>Scope</b>	Broad and generalizable.	Limited to a particular problem or setting but may have wider applicability.	Very limited; confined to a specific classroom, school, or situation.
<b>Researcher</b>	Usually conducted by scholars, universities, or research institutions.	Conducted by researchers, policymakers, or educational agencies.	Conducted mainly by teachers, headmasters, or practitioners.
<b>Outcome</b>	Development of new theories, concepts, or models.	Development of methods, strategies, or interventions to solve problems.	Immediate improvement in practice and decision-making.
<b>Time Required</b>	Long-term.	Moderate duration.	Short-term and cyclical.
<b>Example in Education</b>	Studying how children develop language skills.	Studying the effectiveness of a new teaching method in mathematics.	A teacher testing a new technique to improve students' reading skills in one class.
<b>Generalization of Results</b>	High generalization possible.	Moderate generalization.	Very limited generalization.

### Check Your Progress

**Q.1** Define fundamental research and explain its meaning, characteristics, and scope in educational research.

**Q.2.** Define applied research and explain its meaning, characteristics, and scope in education.

**Q.3.** Define action research and explain its meaning, characteristics, and scope in education.

**Q.4.** Discuss the importance of action research in classroom improvement.

**Q.5.** Distinguish between applied research and action research in terms of meaning, characteristics, and scope.

## **2.5 Summing Up**

- Fundamental research, also known as basic or pure research, is conducted to develop new knowledge and establish general principles or theories in education. It is mainly theoretical in nature and is not immediately concerned with practical application.
- Characteristics of fundamental research are: **a)** It is theoretical and concept-oriented, **b)** It aims at knowledge for its own sake, **c)** It discovers general principles and laws, **d)** It is systematic and scientific, **e)** Its findings have wide applicability.
- Applied research is conducted to solve specific, practical problems in educational settings. It applies the theories and principles developed through fundamental research to real-life situations. The primary aim of applied research is to improve educational practices such as teaching methods, curriculum development, evaluation systems, and administrative procedures. It is problem-oriented and directly related to field application.

## **2.6 Answer to Self Assessment Questions:**

Answer to Q. No.1: Basic

Answer to Q. No.2: Theoretical

Answer to Q. No.3: Knowledge

Answer to Q. No.4: Problem

Answer to Q. No.5: Practice

Answer to Q. No.6: Practical

Answer to Q. No.7: Practical

Answer to Q. No.8: Classroom

Answer to Q. No.9: Small

Answer to Q. No.10: Spiral

Answer to Q. No.11: Teaching

Answer to Q. No.12: Improvement

## **2.7 References and Suggested Readings:**

- Best, J. W., & Kahn, J. V. (2016). *Research in education* (10th ed.). Pearson Education.
- Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education* (8th ed.). Routledge.
- Kothari, C. R., & Garg, G. (2019). *Research methodology: Methods and techniques* (4th ed.). New Age International.
- Mouly, G. J. (1978). *Educational research: The art and science of investigation*. Allyn and Bacon.
- Singh, Y. K. (2011). *Fundamentals of research methodology and statistics*. New Age International.
- Wiersma, W., & Jurs, S. G. (2009). *Research methods in education: An introduction* (9th ed.). Pearson.

---X---

## UNIT- 3

### HISTORICAL METHOD OF EDUCATIONAL RESEARCH – NATURE, PURPOSE, TYPES

#### **Unit Structure:**

- 3.1 Introduction
- 3.2 Objectives
- 3.3 Meaning of Historical Research
- 3.4 Nature of Historical Research
- 3.5. Purpose of Historical Research
- 3.6 Value of Historical Research in Education
- 3.7 Types of Historical Research
- 3.8 Steps in Historical Research
- 3.9 Writing of the Research Report
- 3.10 Summing Up
- 3.11 Answer to Self Assessment Questions
- 3.12 References and Suggested Readings

#### **3.1 INTRODUCTION:**

History is a meaningful and an organised record of past events. It is not merely a list of events arranged chronologically, but a valid integrated account of social, cultural, economic and political forces that had operated simultaneously to produce a historical event. Education too, has a history of its own which has progressed under the influence of such forces. A understanding of the historical background of education would enable the educator to recognise the ills of most educational practices which were tried in the past and found wanting.

### 3.2 OBJECTIVES:

After going through this unit you will be able to—

- *discuss* the meaning, nature, purpose and value of historical method of educational research;
- *know* the types , steps of historical of educational research.

### 3.3 MEANING OF HISTORICAL RESAERCH:

Historical research in education is a systematic method of collecting, evaluating, verifying, and interpreting evidence from the past to understand educational events, ideas, institutions, and practices. It helps explain how present educational systems, policies, and philosophies have evolved.

Historical research has been defined as the organized and objective location, evaluation and synthesis of evidence in order to establish facts and draw conclusions about past events. It involves a critical inquiry of a previous age with the aim of reconstructing a faithful representation of the past. In historical research, the investigator studies documents and other sources that contain facts concerning the research theme with the objective of achieving better understanding of present policies, practices, problems and institutions. Here an attempt is made to examine past events or combinations of events and establish facts in order to arrive at conclusions concerning past events or predict future events. Historical research is a type of analytical research. Its common methodological characteristics include:

- i. identifying a research topic that addresses past events,
- ii. review of primary and secondary data,
- iii. systematic collection and objective evaluation of data related to past occurrences with the help of techniques of criticism for historical searches and evaluation of the information and
- iv. synthesis and explanation of findings in order to test hypotheses concerning causes, effects or trends of these events that may help to explain present events and anticipate future events. Historical studies attempt to provide information and understanding of past historical, legal and policy events. The historical method consists of the techniques and guidelines by which historians use historical sources and other evidences to research and then to write history.

### 3.4 NATURE OF HISTORICAL RESEARCH:

Historical research attempts to establish facts so as to arrive at conclusions concerning past events. This is usually accompanied by an interpretation of these events and of their relevance to present circumstances and what might happen in the future. The main purpose of historical research, there-fore, is to arrive at an accurate account of the past so as to gain a clearer perspective of the present. This knowledge enables us at least partially to predict and control our future existence.

Historical research, as any other type of research, includes the delimitation of a problem, formulating hypotheses or tentative generalizations, gathering and analysing data, and arriving at conclusions or generalizations based upon deductive-inductive reasoning. However, the historian faces greater difficulties than researchers in any other field. He, according to Ary et al (1972, p. 283), lacks control over both treatment and measurement of data, has relatively little control over sampling, and has no opportunity for replication. Historical data is a closed class of data located along a fixed temporal locus and historian has no choice of sampling his data, and he is supposed to include every type of data that comes his way. Historical research is not based upon experimentation, but upon reports of observation which cannot be repeated. The historian handles a data of unique which cannot be repeated. The historian handles data of unique type. They are mainly traces of past events in the form of various types of documents, relics, records, and artifacts having a direct or indirect impact on the event under study.

The job of the historian becomes more complicated when he derives math from historical evidence. The major difficulty lies in the fact that the data on which historical research is based are invariably relatively inadequate and at times the study is conducted with all of the independ ability that the data may entail. According to Best (1977, p. 344):

*“The historian must depend upon the reported observations of others, often witnesses of doubtful competence and sometimes of doubtful objectivity”*

These obviously pose difficulty in matters of objectivity of interpretation.

The date of occurrence of a certain historical event is another difficulty. It may be difficult to determine it partly because of changes brought out in the system of calender and partly due to incomplete information.

Some of the characteristics of historical research are as follows:

1. It is not a mere amassing of facts and data or even a portrayal of past events.
2. It is a flowing, vibrant report of past events which involves an analysis and explanation of these occurrences with the objective of recapturing the nuances, personalities and ideas that influenced these events.
3. Conducting historical research involves the process of collecting and reading the research material collected and writing the manuscript from the data collected. The researcher often goes back-and-forth between collecting, reading, and writing. i.e., the process of data collection and analysis are done simultaneously are not two distinct phases of research.
4. It deals with discovery of data that already exists and does not involve creation of data using structured tools.
5. It is analytical in that it uses logical induction
6. It records and evaluates the accomplishments of individuals. Agencies or institutions.

### **3.5 PURPOSES OF HISTORICAL RESEARCH:**

Conducting historical research in education can serve several purposes. Some of the important ones are as under:

1. It helps educationists to find out solutions to modern problems which have their roots in the past. i.e., it serves the purpose of bringing about reforms in education. The work of a historical researcher sometimes sensitizes educators to unjust or misguided practices in the past which may have unknowingly continued into the present and require reform. A historical researcher studies the past with a detached perspective and without any ego-involvement with the past practices. Hence it could be easier for educationists to identify misguided practices thus enabling them to bring about reforms.
2. It throws light on present trends and can help in predicting future trends. If we recognize how an educationist or a group of educationists acted in the past, we can predict how they will act in future. Similarly, studying the past enables a researcher to understand the factors/causes affecting present trends. In order to make such future predictions reliable and trustworthy, the historical researcher needs to identify and clearly describe in which

ways the past differs from the present context and how the present social, economic and political situations and policies could have an impact on the present and the future.

3. It enables a researcher to re-evaluate data in relation to selected hypotheses, theories and generalizations that are presently held about the past.
4. It emphasizes and analyzes the relative importance and the effect of the various interactions in the prevailing cultures.
5. It enables us to understand how and why educational theories and practices developed.

### **STOP TO CONSIDER**

The historical method of educational research is a systematic study of past educational events, ideas, institutions, and practices in order to understand their development and influence on present education. It involves collecting information from primary and secondary sources such as records, documents, letters, reports, and books, and interpreting them carefully to draw meaningful conclusions.

The nature of historical research is descriptive, qualitative, and analytical. It is based on evidence and requires careful verification of sources through external and internal criticism to ensure authenticity and accuracy. The method is systematic and interpretative, focusing on understanding relationships and trends over time rather than conducting experiments.

The main purpose of the historical method is to trace the origin and development of educational systems, policies, and practices. It helps educators and researchers learn from past successes and failures, understand present educational trends in the light of historical background, and provide guidance for future educational planning and improvement.

### **Self Assessment Questions**

**Q.1.** Historical research deals with the study of the \_\_\_\_\_.

**Q.2.** The historical research is mostly \_\_\_\_\_ in approach.

Q.3. The historical method is mainly \_\_\_\_\_ in nature.

Q.4. Write a type of historical research.

### **3.6 VALUE OF HISTORICAL RESEARCH IN EDUCATION:**

Historical research has great value in the field of educational research because it is necessary to know and understand educational achievements and trends of the past in order to gain perspective on present and future directions. Knight (1934), as quoted by Good, Barr and Scates (1941, p.243) has given the following analysis of the value of historical research:

1. A knowledge of the history of schools and other educational agencies is an important part of the professional training of the teacher or the school administrator.
2. Much of the work of the school is traditional. The nature of the work of the teacher and the school administrator is restrictive and tends to foster prejudices in favour of familiar methods. The history of education is the “sovereign solvent” of educational prejudices.
3. The history of education enables the educational worker to detect fads and fill in whatever form they may appear, and it serves as a necessary preliminary to educational reform.
4. Only in the light of their origin and growth can the numerous educational problems of the present be viewed sympathetically and without bias by the teacher, the school administrator, or the public.
5. The history of education shows how the functions of social institution shift and how the support and control of education have changed from very simple and local arrangements to those that are now somewhat centralised and complex.
6. The history of education is an ally in the scientific study of educations rather than a competition. It serves to present the educational ideas and standards of other times, and it enables social workers to avoid mistakes of the past.
7. It inspires respect for sound scholarship and reverence for great teachers.

### **3.7 TYPES OF HISTORICAL RESEARCH:**

Education has a history that needs to be studied in scholarly detail. Historical studies that could be conducted with profit to the field of education. May include the following

1. Bibliographic research.
2. Legal research.
3. Studying the history of ideas.
4. Studying the history of institutions and organizations

#### ***1. Bibliographic Research:***

Bibliographic research aims at determining and presenting truthfully the important facts about the life, character, and achievements of important educators. In Indian context one may study the contributions of Gandhiji, Tagore and other leading educationists and their influence on current educational practice and thought.

#### ***2. Legal Research:***

Legal research is of immense value and interest to educational administrators. It aims to study the legal basis of educational institutions run by different religions and castes, relation between central and state governments with regard to education, legal status of teachers and students, ad-ministration of private aided schools, school finance, participation of students in the administration of universities, etc. Legal research needs special training in the field of law, and anyone without this training is not competent to do this type of research.

#### ***3. Studying the History of Ideas:***

Studying the history of ideas involves the tracing of major philosophical or scientific thoughts from their origins through their different stages of development. It also aims at tracing of changes in popular thoughts and attitudes over a given period of time. The evolution of current concepts like team teaching, the problem-solving approach, mastery-learning approach, etc provide important topics of historical research.

#### ***4. Studying the History of Institutions and Organizations:***

Studying the history of some prominent schools, universities and other Historical research. When studying such history, the same general method educational institutions also provide

numerous problems for significant applies as for the study of an educator's life. In India for example, one may study the history of the growth and development of Vishwa Bharti University.

### **3.8 STEPS IN HISTORICAL RESEARCH:**

The steps involved in undertaking a historical research are not different from other forms of research, but the nature of the subject matter presents a researcher some peculiar problems and requires him to apply some special standards and techniques. In general, historical research involves the following steps:

1. Selection of the problem
2. Formulation of hypotheses
3. Collection of data
4. Criticism of data
5. Interpretation and reporting of findings.

#### **1. Selection of the Problem:**

A researcher may select a problem pertaining to the history of individuals, institutions, organizations, law, curriculum, administration, text-books, teacher education, equipment, important concepts and thoughts that have influenced education during a specific period of time in a given culture or sub-culture determined by religion, caste, sex, age or work. He may delimit his study to an era of events in a local, regional, or national setting, or he may study the trend of events in different areas, different societies, or different cultures. The historian may discover new knowledge, the meaning of which, when interpreted will provide answers about past events. Sometimes he may doubt an old interpretation of existing data and then attempts to provide a more satisfactory explanation of past events. The researcher should exercise due care in selecting and delimiting the historical problem for investigation. He should check that the problem selected should not only be of historical and current significance, but answerable by available methods of research and by the available sources of data. Sometimes many worthwhile topics of historical importance may be discarded when adequate data are not available.

## **2. Formulation of Hypotheses:**

The hypotheses that the researcher constructs for historical research are useful in explaining events, conditions or phenomena of the period in question. Sometimes it is argued that in such type of study researcher is merely interested in concrete events in their singularity has merely to check the validity and authenticity of facts about past may not formulate any hypotheses in such investigations. But the finding and arrange them in a chronological sequence. Therefore, the researcher may not formulate any hypotheses in such investigations. But the findings based on unstated hypotheses are ambiguous and do not explain are ambiguous or describe the structural interrelations of the phenomena under study. The reports of such findings relate what happened in the past but do not explain how and why the events occurred in a particular sequence.

However, it must be noted that the hypotheses for historical research explicit statements that tentatively explain the occurrence of events may not be formal hypotheses to be tested. Rather, they are written conditions. Van Dalen (1973, p. 177) is of the opinion that:

*An explicit statement, or a systematic awareness of the hypotheses in determining what facts were significant, clarifies the relationship between the investigator's ideas and the facts he reports, and it minimizes the possibility of employing trivial, biased, conflicting, faulty, or the hypotheses.*

While formulating hypotheses, a researcher may formulate questions that are most appropriate for the past events he is investigating and then directs his research towards seeking answers to these questions with the help of evidences.

## **3. Collection of Data:**

After the problem has been selected and stated and appropriate hypotheses or questions have been formulated, the researcher has to collect all the data available so that hypotheses may be thoroughly verified. The collection of data in historical research a tedious and time consuming process. The researcher usually sifts through the vast materials of human activity that testify about past events, and from these he identifies and selects data that are relevant to his problem. These data are classified into primary and secondary sources. It is important for a researcher to distinguish between them and develop skill in locating them.

### **➤ Primary sources**

Primary sources are eye witness accounts and are the only solid bases of historical enquiry.

Good, Barr and Scates (1941, p. 253) have called them as the “first witnesses to a fact”. The original documents or remains come under the category of primary sources. They are available in written, pictorial and mechanical forms as under:

1. **Personal records**, Certificates, diaries, autobiographies, affidavits, declarations, letters, wills, deeds, contracts, and original drafts of speeches, articles, books, and pamphlets.
2. **Official records**, Legislative, judicial, or executive documents prepared by central or state governments, municipalities, panchayats or other local bodies, such as constitutions, laws, charters, court proceedings and decisions, the data preserved by missionaries and other religious organizations such as financial records and records of the minutes of the meetings of managing or governing bodies, the information compiled by central or state education departments, special commissions, professional organizations, school boards, administrative authorities, such as the minutes of meetings, reports of committees and commissions, administrative orders, school surveys, annual reports, budget, attendance records, cumulative records of dramas, games, musical and athletic events, and examinations.
3. **Oral testimony of traditions and events**. Myths, folk tales, family stories, ceremonies, spoken account of a witness of an event, interviews with administrators, teachers, students, parents or guardians, school patrons, and prominent educationists.
4. **Pictorial records**. Photographs, movies, micro-films, drawings, paintings, coins, and sculpture.
5. **Mechanical records**. Photograph records of events and tape recordings of interviews, meetings, and speeches.
6. **Remains or relics**. Fossils, skeletons, tools, weapons, clothing, buildings, furniture, utensils, art objects, teaching materials, samples of examination question papers, samples of student work, and murals.

The remains or relics are more trustworthy than the records, reports or words of others, because a researcher can examine them personally. He can actually view, handle, measure, weigh, and describe an object or instrument of the past that has been preserved. However, he has to search for clues in reports made by men in the past to interpret how, when, or why the object or an instrument was used. These remains or relics are handed down from the past without the specific purpose of transmitting information from an unconscious testimony of events in the lives of people. They sometimes reveal the events and conditions better than

official documents. The remains of an ancient burial place, for example, may impart more information about the food, tools, religious beliefs, customs and means of livelihood of a particular community.

➤ **Secondary Sources**

Secondary sources are the accounts of an event provided by a person. Who did not directly observe the event, object, or code. They may have directly contacted an actual observer and an account by an observer. Since the testimony of the period is actual participant or observer, secondary sources meant danger of inaccuracy and distortion. For this reason the researcher should rely as much as possible on primary sources and use the secondary sources only to bridge the gaps between the various pieces of primary data.

At times, however, it is not always possible to obtain primary data and in such situations the researcher may have to rely on secondary sources. These situations, according to Mouly (1963, p. 208), are frequent in fiction where only fragmentary reports concerning the processes of are available. He is of the opinion that people in the past considered education so trivial that they did not bother recording anything nature or its organization and consequently, it is relatively difficult identify suitable primary data to permit the conduct of a good historical research in education. The personal documents as diaries and personal letters also leave wide gaps for the researcher to get the required continuity without resorting to secondary sources.

Secondary sources, if used carefully, serve many useful purposes. They may acquaint a researcher to major theoretical issues in his field and to the work that has been done in the area under study. They may suggest possible solutions of the problem and working hypotheses and may introduce the researcher to important primary sources.

A rigid classification of source materials is not always possible and practicable. Some type of data may be primary sources for some purposes and secondary sources for another. For example, a high school textbook in Indian History will be classified ordinarily a secondary source. But if one were making a study of the changing emphasis on national integration in high school history textbooks, the book would be a primary source of data

In the location of source materials in historical research, the card catalog, periodical indexes, bibliographies, historical reviews, dissertations, and research journals provide helpful guides. It may be noted that historical studies involve more intensive bibliographical work and library usage than any other type of research, and hence, the researcher should be careful

while assembling full bibliographical information in his note-taking system to facilitate proper documentation.

#### **4. Criticism of Data:**

After the data have been identified, the researcher must learn to read them correctly as a basis for developing sound ideas of the past, which in turn may help in interpretation present trends and possibly in predicting future events. For this the researcher subjects his data to rigorous evaluation, which is known as criticism of the data. It involves the dual processes of establishing the authenticity of the source and of establishing the validity of its contents

The process of establishing authenticity of the data is termed as external criticism and that of establishing the validity of their content is termed as internal criticism.

##### **➤ External Criticism**

External criticism, also called as lower criticism, checks the genuine ness and authenticity of the source material. It helps to determine whether it is what it appears or claims to be and whether it reads true to be original so as to save the researcher from being the victim of a fraud. The purpose of external criticism according to Mouly (1963, p. 210), is, however, not so much negative that is, the detection of fraud as it is the establishment of historical truth’.

To determine the genuineness of the historical data, a researcher must possess a rich fund of historical and general knowledge. According to Van Dalen (1973, p. 168) he also needs “a good chronological sense, a versatile intellect, good common sense, an intelligent understanding of human behaviour, and good plenty of patience and persistence”. The problem of establishing age or authorship of a document may involve such techniques as authentication of signatures, handwriting, script, and type, chemical analysis of paint, carbon dating of artifacts, ink, paper, cloth, stone, metals or wood. The researcher, therefore, must be familiar with chemistry, archaeology, cartography, art, literature, philology, anthropology, paleography, or various modern and ancient languages. If he does not have a knowledge of these fields, he may acquire special training in the fields that are most closely related to his historical problem or may seek the help of competent experts in the field.

##### **➤ Internal Criticism:**

After the authenticity of the historical data has been established, the researcher proceeds to internal criticism. It is also called as higher criticism and is concerned with the validity, credibility, or worth of the content of the document. Besides the textual criticism, it also

involves such factors competence, good faith, bias and general reputation of the author. Internal criticism is positive in nature when the researcher seeks to discover the literal and the real meaning of the text. It is negative when the researcher tries to seek every possible reason for disbelieving the statement made, questioning critically the competence, truthfulness or accuracy, and honesty of the author. Good, Barr and Scates (1941, p. 262) are of the opinion that both positive and negative criticisms are essential in historical research but the researcher should not go so far as to be cynical and hyper. Critical

The competence and accuracy of an author is evaluated in relation to his status as a trained eye witness, presence of emotional stress or pressure that might influence the observation, and the extent to which the conditions for observing were favourable. It is also evaluated in terms of the time period that has elapsed between the event and its recording by the author so as to ascertain whether the author was able to remember accurately the account of the event.

The author of a document may know the truth, but for certain reasons he may report the evidence only in part or in a distorted form. Distortion of the fact may result from author's motive, bias or prejudice. It may also result from his personal vanity or ambition, literary artifice, known ignorance about the subject, known weakness of telling lies or half truths, desire to flatter his superiors, desire to please the public, political or religious views, or vested interests. According to Good (1966 p. 173):

The test of truthfulness and honesty include evaluation of the author's characteristics and statements in relation to personal or vested interests, race, nation, party, region, sect, social level, economic group, profession, conventional formulas rather than true sentiments, vanity or boasting, attempt to please some individual or group exaggerations, and embellishments.

The validity of a historical fact contained in a document can sometimes be evaluated by comparing it with the statements of other authors. When there is disagreement among authors, the researcher must establish which one is correct. This he must do on the basis of overall credibility, reputation, independent authentication and general consistency with other known facts.

Good, Barr and Scates (1941, p. 259) have listed the following series of questions which a researcher may find useful in the processes of external and internal criticism of historical data:

- i. Who was the author, not merely what was his name but what were his personality, character, position, and so forth?

- ii. What were his general qualifications as a reporter alertness, character, bias?
- iii. What were his special qualifications and disqualifications as a reporter of the matters here treated?
  - a) How was he interested in the events related?
  - b) How was he situated for observation of the events?
  - c) Had he the necessary general and technical knowledge for learning and reporting the events?
- iv. How soon after the events was the document written?
- v. How was the document written, from memory, after consultation with others, after checking the facts, or by combining earlier trial drafts?
- vi. How is the document related to other document?
  - a) Is it an original source, wholly or in part?
  - b) If the latter, what parts are original, what borrowed, whence? How credible are the borrowed materials?
  - c) How and how accurately is the borrowing done?
  - d) How is the borrowed material changed, how much?

Invariably, the researcher gets answers for all these questions and therefore, he has to depend upon partially, on evidences he can no longer verify. At times, he will have to rely on the inferences based upon logical deductions in order to bridge the gaps in the information. In such cases, Moulay (1963, p. 214) suggests that a researcher should predicate his remarks with phrase “according to...” in order to safeguard his reputation and status as a scientist.

### **5. Interpretation of Data:**

After the data have been collected and criticized, the researcher turns himself to the task of interpretation of these data in the light of his problem. Because of the unique nature of the historical data, the task of interpretation becomes complicated and acquires special significance. It requires greatest ingenuity and imagination on the part of the researcher.

The researcher in the historical type of investigation must be very cautious while dealing with ‘cause and effect’ relationships. Here his position is entirely different from a researcher of

physical sciences who deals with very simple isolated laboratory phenomena. Historical causes are invariably complex and the historical researcher must accept the fact that he is not dealing with clear-cut cases of cause and effect. According to Mouly (1963, p. 214).

*Causation is a troublesome concept in science, it is doubly so in historical research where 'causes' are in the nature of antecedents, or precipitating factors, rather than 'causes' in restricted scientific sense.*

Since history is actually a record of the chain of related events, it becomes very difficult for a researcher to interpret that one event in the chain was caused by the previous event in the chain. Furthermore, many conditions and circumstances interact and become responsible for a particular event. Therefore, it makes the task of the researcher difficult, to assess accurately the influence of a particular event and to identify clear-cut cause-effect relationships.

The historical researcher must also be very cautious in his use of analogy in the interpretation of data. While drawing comparisons between one historical event and any number of others, he must carefully make use of similarities as well as of differences.

The ultimate goal in the historical type of research is not only to establish facts but also to determine trends which the data may suggest and to draw inferences from the data. The researcher must show an understanding of the sequence of events and must draw a vertical relationship of preceding facts with succeeding one along the time line. His goal should be one of synthesis and interpretation rather than mere summation.

### **3.9 WRITING OF THE RESEARCH REPORT:**

After the data have been interpreted, the researcher has to write a well-organized report of his study. The report of the historical research includes a statement of the problem, a review of the literature, the statement of the objectives and research questions, survey and sources of data, and methods of its collection, organization of heads of classification and ordering of data, the criticism; analysis and interpretation of data, the conclusions reached and a bibliography.

The writing of historical research report needs the highest level of scholarship on the part of the researcher. This is a matter of expositional strategy which calls for creativity in addition to the qualities of imagination and ingenuity. The researcher must be elegant and objective in his style of writing the research report. However, because of the discontinuous and

incomplete nature of historical data on which valid generalizations can be established it is generally accepted that in writing of historical research report, the researcher has to be permitted a little more freedom on the subjective interpretation of data. At the same time, it must be ensured that the presentation is sufficiently systematic and does not hide or distort the truth.

At times, the gaps in the historical data are such that an attempt of interpretation becomes futile and unsafe. In such situations the best course for the researcher is to indicate the existence of the gap and stop there, or to suggest a number of alternative explanations.

The historical research report must be presented in the logical, chronological and topical order. Good, Barr and Scates (1941, p. 265) also recommend that an appropriate combination of the chronological and topical organization of historical data, involving consideration of such influences or forces as political institutions law, economics, geography, social conditions, war, national culture, art, literature religion, great leaders, natural sources, etc. seems best.

Reports of historical research should neither be dull and unattractive nor too flowery and ornamental. They must follow precision, continuity. Clarity and dignity in their style to give a sense of design and completeness.

#### **Self Assessment Questions**

Q.5. What is the another type of historical research?

Q.6. What is research based on records and documents called?

Q.7. What is the main purpose of historical research?

Q.8. What is the basis of historical research?

Q.9. Verification of the authenticity of a document is called \_\_\_\_\_.(Fill in the blank).

Q.10. Name one source of historical data.

### **Check Your Progress**

- Q.1. Explain the meaning of the Historical Method of educational research.
- Q.2. Describe the nature of the Historical Method of educational research.
- Q.3. Discuss the purpose of the Historical Method of educational research.
- Q.4. Explain the types of Historical Research in education.

### **3.10 Summing Up**

- Historical research has been defined as the organized and objective location, evaluation and synthesis of evidence in order to establish facts and draw conclusions about past events. It involves a critical inquiry of a previous age with the aim of reconstructing a faithful representation of the past. In historical research, the investigator studies documents and other sources that contain facts concerning the research theme with the objective of achieving better understanding of present policies, practices, problems and institutions.
- Historical research attempts to establish facts so as to arrive at conclusions concerning past events. This is usually accompanied by an interpretation of these events and of their relevance to present circumstances and what might happen in the future. The main purpose of historical research, there-fore, is to arrive at an accurate account of the past so as to gain a clearer perspective of the present. This knowledge enables us at least partially to predict and control our future existence.
- The job of the historian becomes more complicated when he derives truth from historical evidence. The major difficulty lies in the fact that the data on which historical research is based are invariably relatively inadequate and at times the study is conducted with all of the independent ability that the data may entail. According to Best (1977, p. 344):  
  
“The historian must depend upon the reported observations of others, often witnesses of doubtful competence and sometimes of doubtful objectivity”
- The main purpose of the historical method is to trace the origin and development of educational systems, policies, and practices. It helps educators and researchers learn from past successes and failures, understand present educational trends in the light

of historical background, and provide guidance for future educational planning and improvement.

- Historical research has great value in the field of educational research because it is necessary to know and understand educational achievements and trends of the past in order to gain perspective on present and future directions.
- Education has a history that needs to be studied in scholarly detail. Historical studies that could be conducted with profit to the field of education. May include the following :
  1. Bibliographic research.
  2. Legal research.
  3. Studying the history of ideas.
  4. Studying the history of institutions and organizations
- The steps involved in undertaking a historical research are not different from other forms of research, but the nature of the subject matter presents a researcher some peculiar problems and requires him to apply some special standards and techniques. In general, historical research involves the following steps:
  - i. Selection of the problem
  - ii. Formulation of hypotheses
  - iii. Collection of data
  - iv. Criticism of data
  - v. Interpretation and reporting of findings.
- The writing of historical research report needs the highest level of scholarship on the part of the researcher. This is a matter of expositional strategy which calls for creativity in addition to the qualities of imagination and ingenuity. The researcher must be elegant and objective in his style of writing the research report. However, because of the discontinuous and incomplete nature of historical data on which valid generalizations can be established it is generally accepted that in writing of historical research report, the researcher has to be permitted a little more freedom on the subjective interpretation of data. At the same time, it must be ensured that the presentation is sufficiently systematic and does not hide or distort the truth.

### 3.11 Answer to Self Assessment Questions:

Answer to Q. No.1: Past

Answer to Q. No.2: Qualitative

Answer to Q. No.3: Descriptive

Answer to Q. No.4: Narrative

Answer to Q. No.5: Analytical

Answer to Q. No.6: Documentary

Answer to Q. No.7: Development

Answer to Q. No.8: Evidence

Answer to Q. No.9: External Criticism

Answer to Q. No.10: Official Records

### 3.12 References and Suggested Readings:

- Best, J. W., & Kahn, J. V. (2016). *Research in education* (10th ed.). Pearson Education.
- Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education* (8th ed.). Routledge.
- Kothari, C. R., & Garg, G. (2019). *Research methodology: Methods and techniques* (4th ed.). New Age International.
- Mouly, G. J. (1978). *Educational research: The art and science of investigation*. Allyn and Bacon.
- Singh, Y. K. (2011). *Fundamentals of research methodology and statistics*. New Age International.
- Wiersma, W., & Jurs, S. G. (2009). *Research methods in education: An introduction* (9th ed.). Pearson.

---x---

## UNIT- 4

### THE DESCRIPTIVE METHOD OF EDUCATIONAL RESEARCH – NATURE, VALUE, TYPES AND STEPS

#### **Unit Structure:**

- 4.1 Introduction
- 4.2 Objectives
- 4.3 Meaning of Descriptive Research
- 4.4 Nature of Descriptive Research
- 4.5 Value of Descriptive Research
- 4.6 Types of Descriptive Research
  - 4.6.1 Survey Studies
  - 4.6.2 Interrelationship Studies
  - 4.6.3 Developmental Studies
- 4.7 Steps in Descriptive Research
- 4.8 Summing Up.
- 4.9 Answer to Self Asking Questions
- 4.10 References and Suggested Readings

#### **4.1 INTRODUCTION:**

One of the goals of research is report and describe (other goals include forecast and explanation). Descriptive research methods are attractive much as they sound they describe situations. They do not make exact predictions, and they do not find out cause and effect.

Descriptive research does not fit in order into the definition of either quantitative or qualitative research methodologies, but as a substitute it can employ elements of both, regularly within the same study. The phrase descriptive research refers to the type of research problem, research question, research design, and data analysis that is useful to a given research problem. Descriptive statistics tell what is, while inferential statistics try to determine cause and effect.

The nature of question asked by the researcher will eventually decide the type of advance needed to inclusive and correct evaluation of the problem at hand. Descriptive studies,

primarily are anxious with finding out what is, might be applied to study the following questions: Do teachers hold favourable attitudes toward using ICT in their teaching? What have been the reactions of school administrators to technological innovations in teacher training programmes? How the new e-resources (books) do are different in comparison to the print-based textbooks?

#### **4.2 OBJECTIVES:**

After going through this unit you will be able to

- *discuss* the meaning, nature and value of descriptive method of educational research;
- *know* the types , steps of descriptive method of educational research.

#### **4.3 MEANING OF DESCRIPTIVE RESEARCH:**

Descriptive research can either be quantitative or qualitative. It may use collections of quantitative data that can be tabulated along a continuum in numerical form, such as scores on a test or the number of times a person chooses to use a certain feature of a multimedia programme, or it can explain categories of information such as based on stratification viz; gender or patterns of interaction when using technology in a group situation. Descriptive research depicts, and expresses the data collection. It frequently uses visual aids such involves gathering data that explain events and then organizes, tabulates, Because, the human mind cannot extort the full get the large mass of raw as tables, graphs and charts to aid in understanding the data distribution data, descriptive statistics are very vital in reducing the data to convenient form. When in-depth, account descriptions of small numbers of cases are involved, the research uses explanation as an instrument to systematize data into patterns that appear during analysis. Those patterns support the mind in comprehending a qualitative study and its implications.

Most quantitative research falls into two areas: studies that explain events and studies aimed at discovering inferences or causal relationships. Descriptive study is aimed to find out what is, so observational and survey methods are generally used to collect descriptive data.

Descriptive studies report summary data in statistical form such as measures of central tendency including the mean, median, and mode, deviance from the mean, variation, percentage, and correlation between variables. Survey research commonly includes that type

of measurement, but often goes beyond the descriptive statistics in order to draw inferences. Descriptive research is matchless in the number of variables employed.

Like other types of research, descriptive research can contain manifold variables for analysis, yet unlike other methods, it needs only one variable. For example, a descriptive study might use methods of analyzing correlations between different variables by using tests such as Pearson's Product Moment correlation, regression, or multiple regression analysis. On the other hand, descriptive research might generally report the percentage summary on a single variable.

Descriptive statistics utilize data collection and analysis techniques that yield reports concerning the measures of central tendency, variation, and correlation. The combination of its characteristic summary and correlational statistics, along with its focus on specific types of research questions, methods, and outcomes is what distinguishes descriptive research from other research types.

Three main purposes of research are to describe, explain, and validate findings. Description emerges following creative exploration, and serves to organize the findings in order to fit them with explanations, and then test or validate those explanations. Many research studies call for the description of natural or man-made phenomena such as their form, structure, activity, change over time, relation to other phenomena, and so on. The description often illuminates knowledge that we might not otherwise notice or even encounter. Several important scientific discoveries as well as anthropological information about events outside of our common experiences have resulted from making such descriptions. For example, astronomers use their telescopes to build up images of various parts of the universe, anthropologists explain life events of socially uncharacteristic situations or cultures uniquely different from us, and educational researchers explain actions within classrooms concerning the execution of new educational technology in teaching learning process. This course often results in the discovery of stars and planets events, new knowledge about value or practices of diverse cultures, or even the truth of classroom life as new technologies are implemented within educational institutions.

Educational researchers may use observation, survey or interview techniques to gather data about group dynamics during educational activities. This data could then be used to recommend definite strategies for implementing ICT or improving teaching strategies.

Descriptive studies have a significant role in educational research. They have greatly increased our information about what happens in schools, colleges and universities.

#### **4.4 NATURE OF DESCRIPTIVE RESEARCH**

Descriptive research studies are designed to obtain pertinent and precise information concerning the current status of phenomena and, whenever possible, to draw valid general conclusions from the facts discovered. They are restricted not only to fact finding but may often result in the formulation of important principles of knowledge and solution of significant problems concerning local, state, national and international issues. Descriptive studies are more than just a collection of data; they involve measurement, classification, analysis, comparison, and interpretation. They collect and provide three types of information:

- i. of what exists with respect to variables or conditions in a situation;
- ii. of what we want by identifying standards or norms with which to compare the present conditions or what experts consider to be desirable, and
- iii. of how to achieve goals by exploring possible ways and means on the basis of the experience of others or the opinions of experts.

The activities of descriptive studies researchers are not different from those of the other researchers. As in any study they

- i. identify and define their problem;
- ii. state their objectives and hypotheses,
- iii. list the assumptions upon which their hypotheses and procedures are based;
- iv. choose appropriate subjects and source materials;
- v. select or construct tools for collecting data;
- vi. specify categories of data that are relevant for the purpose of study, and capable of bringing out significant similarities, differences, or relationships,
- vii. describe, analyze, and interpret their data in clear and precise terms, and
- viii. draw significant and meaningful conclusions.

At times, descriptive researcher is not directed towards hypothesis testing. For example, a District Education Officer wishes to know the number of the students placed in first, second

and third divisions in matriculation examination in a particular year of a district school-wise. He is merely interested in the number, wants to describe a situation that prevails and attempts no explanation of underlying reasons responsible for turning out a large number of first divisioners by some school/schools. This study does not propose or test hypotheses and does not deal with many variables underlying the achievement or lack of achievement of students. It may merely provide information to assist in decision making.

Descriptive studies investigate phenomena in their natural setting. Their purpose is both immediate and long range. They constitute a primitive type of research and do not aspire to develop an organized body of scientific laws. Such studies, however, provide information useful to the solution of local problems and at times provide data to form the basis of research of a more fundamental nature.

Descriptive research differs from other types of research in purpose and scope. A clear-cut distinction can be drawn between descriptive studies and historical studies on the basis of time. The latter deals with the past and the former with the present. The limitations of descriptive investigations, however, are very similar to those of the historical enquiry in that cause and effect relationships are difficult to establish, and the time at which study is conducted is a critical factor in the interpretation of the data. The method of descriptive research, in contrast to an experiment, is relatively less scientifically sophisticated. Here the researcher does not manipulate the variables or arrange for events to happen. In fact, the events that are observed and described by him would have happened even though there had been no observation. Descriptive studies involve events that have already taken place and are related to a present condition.

Descriptive studies vary greatly in complexity. At one extreme, they constitute nothing more than frequency count of events to the study of local problems without any significant research purpose. At the other extreme, they attempt to ascertain significant interrelationships among phenomena.

#### **4.5 VALUE OF DESCRIPTIVE RESEARCH IN EDUCATION:**

The descriptive research method has undoubtedly been the most popular and the most widely used research method in education. It helps to explain educational phenomena in terms of the conditions or relationships that exist, opinions that are held by the students, teachers, parents and experts, processes that are going on, effects that are evident, or trends that are

developing. Because of the apparent ease and directness of this method, a researcher can gather information in terms of individual's opinion about some issue, by a simple questionnaire. At times, descriptive survey is the only means through which opinions, attitudes, suggestions for improvement of educational practices and instruction, and other data can be obtained.

The descriptive investigations are of immense value in solving problems about children, school organization, supervision and administration, curriculum, teaching methods and evaluation. There are a number of questions that arise concerning these aspects of education. For example, one may want to know how many of the teachers in a district possess a Bachelors degree in Education. How do these figures compare with the tendency throughout the state? How many minutes per week are normally devoted to the teaching of English spelling? What proportion of total state budget is reasonable to set aside for adult education? What kind of a curriculum do people really want their children to have at the secondary school stage? At what age and grade level do pupils leave school? What happens to students after they leave school? What higher institutions or vocations do they enter? And so on. Such information is useful to teachers and administrators and in understanding the existing educational problems and also in suggesting ways of meeting them. The head of a school may wish to know how other school systems are being run, so that he can compare his practices with theirs. This way he will be able to know what procedures and standards are superior to those of other schools. The teachers will also study the conditions existing in their classrooms and that of other teachers.

The problems in education directly involve people and the situations precipitating these problems are constantly in a state of change. To keep abreast of changes, descriptive studies conducted at different intervals with representative groups of people will be immensely helpful.

The descriptive type of research is useful in the development of data gathering instruments and tools like checklists, schedules, questionnaires and rating scales. It also provides the background ideas and data from which many more refined or controlled studies of casual relations are made.

### **STOP TO CONSIDER**

The descriptive method of educational research refers to a systematic approach used to describe the present status of educational phenomena. It focuses on studying “what exists” in the current educational situation, such as students’ achievement, teachers’ attitudes, classroom practices, school facilities, or administrative conditions. The method involves collecting data through tools like surveys, questionnaires, interviews, observations, and tests. It aims to present an accurate picture of existing conditions without manipulating or controlling variables.

The descriptive method is fact-finding and systematic in nature. It studies variables as they naturally occur and does not involve experimentation. It may be qualitative, quantitative, or a combination of both approaches. The researcher observes, records, analyzes, and interprets data objectively to ensure accuracy and reliability. It is non-experimental and focuses on describing relationships, trends, and conditions in real-life educational settings.

The main purpose of the descriptive method is to provide a clear and accurate description of present educational situations. It helps in identifying problems, understanding relationships among variables, and assessing the needs of students, teachers, and institutions. The method supports educational planning, policy-making, and improvement by supplying reliable information. It also serves as a foundation for further research, including experimental and analytical studies.

### **Self Assessment Questions**

**Q.1.** What type of research describes existing conditions?

**Q.2.** Descriptive research focuses on \_\_\_\_\_ situation. (Fill up the blank)

**Q.3.** Descriptive research is also known as \_\_\_\_\_ research. (Fill up the blank)

**Q.4.** Descriptive research is mainly \_\_\_\_\_ in approach. (Fill up the blank)

#### **4.6 TYPES OF DESCRIPTIVE RESEARCH:**

Descriptive studies have been classified variously by various writers. Some have classified them on the basis of the purposes they achieve; some on the basis of the geographical areas they cover, and some on the basis of the techniques they employ. These classifications mostly range from the survey, which describes the status quo of educational variables, to the correlational study, which investigates the relationships between variables. For the sake of convenience descriptive studies may be classified in the following three categories:

1. Survey studies,
2. Interrelationship studies,
3. Developmental studies,

Although this classification is arbitrary, yet it seems to have merit from an operational, as well as from an organizational point of view and will be used as the basis of the present discussion. Some investigations fall exclusively within one of these categories, but others have characteristics of more than one.

##### **4.6.1 SURVEY STUDIES:**

Survey studies are conducted to collect detailed descriptions of existing phenomena with the intent of employing data to justify current conditions and practices or to make more intelligent plans for improving them. Their objective is not only to analyze, interpret, and report the status of an institution, group, or area in order to guide practice in the immediate future, but also to determine the adequacy of status by comparing it with established standards. Some surveys are confined to gather all three types of information:

- i. data concerning existing status,
- ii. comparison of existing status with the established status and standards, and
- iii. means of improving the existing status, while others are limited to one or two of these types.

Survey studies may take different forms depending upon the scope, nature and purpose of the problem under investigation. They may be broad or narrow in scope. Some surveys encompass several countries, states or regions, or may be limited to one country, region, state, district, tehsil, city, school system, or some other unit. Survey data may be collected

from every unit of a population or from a representative sample. The information gathered may be concerning a large number of related factors or may be confined to a few selected items.

Survey studies describe and specify the properties of educational phenomena. They include:

- i. School surveys.
- ii. Job analysis,
- iii. Public opinion surveys, *and*
- iv. Social surveys.

1. **School surveys:** The school survey is not new. The first formal survey of the schools of Boise, Idaho (USA) was conducted in 1910. This survey was largely of an inspectional nature and it gradually became the pattern for other school surveys in the United States. But these surveys generated apprehension as well as opposition on the part of local teachers because of their inspectional nature. Furthermore, it was felt that such surveys generally lacked continuity due to non-implementation of the recommendations, and, therefore, they were of limited overall value. Consequently, some improvements were suggested and emphasis now is on comprehensive surveys designed to evaluate the school as a functional unit.

- ***Nature and purpose of school surveys:***

The school survey generally is a comprehensive study of existing conditions. Its main purpose is to determine the overall effectiveness of the school programme and suggest improvement where necessary. In terms of purposes, Cooper (1946) and Reller (1942) have categorized school surveys into three types: (a) the investigative, evaluative or status survey which serves primarily to evaluate existing conditions; (b) the deliberative, developmental, or planning survey, which is intended primarily to make proposals for development and improvement, with a minimum criticism of present circumstances; (c) the implementive survey, which not only makes suggestions for development but also attempts to create conditions in the conduct of the survey which will enhance the prospects of actually achieving survey recommendations.

According to Good (1966, p. 207), the comprehensive school survey usually covers the following aspects of the school system:

- a) Aims, outcomes, pupil achievement, curriculum, method, and instructional aids.
- b) Administrative problems and procedures of the schools.
- c) Financial policies and procedures.
- d) Operation and maintenance of the physical plant.
- e) Pupil transportation.
- f) Staff and personnel.
- g) School plant and related factors.

School surveys may be conducted at the local, state, regional or national level. They may be undertaken at various levels of instruction-elementary, secondary, or higher. Some of them may be concerned with the problem of school building only. Others may study community and school setting available financial resources, pupil transportation system, or estimate future school enrolment.

Acquiring information about the characteristics of educational personnel and nature of pupils may be the purpose of many school surveys. Such surveys may gather information about teachers, supervisors, and administrators. They may study the behaviour of teachers and other instructional personnel in the classroom, the school, and the community with the objective of assessing or improving teaching effectiveness. Determining the physical-fitness of teachers, their attitudes, socio-economic conditions, responsibilities, status and salaries may be the objectives, of some surveys. Information about the behaviour patterns of pupils in classrooms, with peers, at home, and in the community may also be sought through the school surveys. Some surveys are concerned with the study of pupils' knowledge, skills, academic achievement, intelligence, aptitudes, work or study habits, health practices, extra-curricular activities, and recreational aspects. School surveys may also explore the number of drop outs, the number and type of handicapped or other exceptional students, or the number and nature of delinquency incidents.

School surveys are sometimes conducted to study the educational programmes, processes, and outcomes. They may seek information about the equipment and supplies, such as the number and kinds of library books or the amount and types of laboratory, athletic or audio visual equipment. Some surveys may be concerned with the curriculum, textbooks and other instructional materials. Other surveys may seek information about aspects of social structure in the classroom, home, or community that may influence learning

The scope of school surveys is large and varied. A single comprehensive school survey may be comprised of various parts or constituent surveys. These include: a). survey testing, b). school appraisal; c). status studies; d). financial studies; e). curriculum studies, and f). building surveys.

**Survey Testing:** Tests serve a variety of functions. They are intended not only to measure maximum capability, such as achievement, aptitude and intelligence but also to describe typical behaviour such as personality traits, interests and attitudes. For the purposes of survey testing, we shall be mainly concerned with achievement, intelligence and personality testings.

**Achievement Testing:** Survey testing of educational achievements has become an important aspect of school surveys. Achievement, tests of the objective type are being, and have been constructed by various agencies. They are based upon the current courses of study prescribed by school boards for the schools within the area of system under investigation and may cover any or all subjects and grades. Achievement testing surveys may serve the following purposes:

1. They may be used to compare the attainment of present pupils with that of the previous years' and may in the case of unsatisfactory performance lead an investigation of the causes and remedies.
2. They enable the administrator to compare the performance of different schools.
3. They furnish national or local norms which can provide a basis for assessing certain curricular strengths and weaknesses.
4. They help to determine whether an innovative programme is better or poorer than the conventional one in facilitating the attainment of specific curricular objectives.
5. Teachers and heads of the schools may use the results of city or state-wide survey testing for a critical analysis of their own classes and schools.
6. They enable to identify particular groups of students who are weak so that appropriate remedial measures could be introduced to bring them up.
7. They provide information regarding the objectives of education which are fulfilled satisfactorily and which are not, so that changes in the methods of teaching could be introduced to improve the quality of education and thereby ensure realisation of the desired objectives.

8. They help in identifying particular groups of students in a state or the nation who are doing better so that studies could be conducted to investigate the characteristics of the educational system being followed there and make the results known, for the benefit of others.
9. They help in locating geographical regions or school systems which are weak so that they could be given more help.

Achievement testing surveys are conducted not just to collect some figures but to provide necessary information for educational administrators and teachers for taking decisions and actions to improve instructional process. A number of such surveys covering large areas have been conducted in the USA. In India, the first step towards such a comprehensive study was undertaken by National Council of Educational Research and Training New Delhi (Kulkarni et al., 1968). The survey was confined to mathematics achievement and conducted at the three levels of education, primary, middle, and high school levels respectively, in all the states of India (except Bihar and Tamil Nadu). Many other organizations like university teaching departments of education, state institutes of education, etc. are constructing achievement tests for the purpose of achievement testing surveys intelligence testing.

***Intelligence Testing:*** The intelligence tests are useful tools for educational researchers. In large group studies of the survey type, the researchers invariably make use of group tests of intelligence-verbal or non-verbal, or both. The intelligence-testing surveys may be used for: (i) Identifying gifted children, (ii) Studying mental growth; (iii) For making decisions for individual students regarding their success in college, university or some other professional course, (iv) For measuring general readiness for learning at different levels of schooling; (v) For dividing large groups of students into relatively homogeneous sections, (vi) For estimating more accurately the degree of mental retardation among children, (vii) For constructing or adopting intelligence tests, (viii) For studying the socially and educationally maladjusted children, and (ix) For indicating the extent of differences of IQ among the children of same chronological age

***Personality Testing:*** Personality in a broad sense is a general term covering the entire constellation of personal characteristics. It includes attitudes, interests, and various other characteristics such as traits, adjustment and needs. Questionnaires, interviews, observations, checklists, rating scales, attitudes scales, personality and interest inventories are frequently used for survey testing in the field of personality.

**School Appraisal:** Appraisal of different aspects of a school or school system is an essential part of school surveys. It is a form of evaluation or scaling according to subjective values. School appraisal is concerned with administrative provisions and practices of an educational institution and the educational attainments of its pupils. It aims at an evaluation of all the conditions and outcomes in a school system. Besides checklists, rating scales, or score cards, the researchers frequently employ other types of evidence such as academic achievement and subsequent success of the pupils. In the USA, a number of schedules and checklists for evaluating schools in such areas as physical education, agriculture, industrial arts, health and home economics, pupil activity projects, guidance, school staff and administration, library service, etc. have been prepared and used

**Status Studies:** Status studies are undertaken for determining the personal and professional status of teachers and other school officials. They may be a part of a school survey, or form a subject for independent study. Studies to investigate the problems of selection and placement of teachers, their work load, their status in relation to the service conditions, health, law, supply and demand, etc. all provide useful subjects for research. In addition to questionnaires and schedules, official records are also utilized in status studies.

**Financial Studies:** The problems relating to the financial position of a school in terms of the sources of finance, the items of expenditure, the deficit, expenditure per student and salaries of teachers form important aspects of school studies. Official records are the main sources for providing data. Questionnaires are also employed by the researchers.

**Curriculum Studies:** The analysis of the existing curriculum in a school system and its comparison with the one existing elsewhere may be a part of a school survey. It can also be taken as an independent study. The curriculum analysis usually includes an analysis of the principles on which the curriculum is based, the needs of the pupils and the community it fulfils, and its limitations. Questionnaires, schedules and checklists are generally employed in these studies.

**Building Surveys:** Surveys of school buildings are undertaken to gather information about their sites and location, the accommodation they provide and the arrangements they have for various classes, subjects, activities or staff. They also provide information about the condition as regards their maintenance and cleanliness, and the improvements or expansions they stand in need of. The building survey of a school system, according to Harris (1960, p. 1021), consists essentially of three steps: (1) the determination of building facilities needed; (ii) an

assessment of the existing and possible sources to accommodate the needs; (iii) specific recommendations as to new structures, their general sizes, functions, and locations, and renovations of existing structures. Building studies may form a part of comprehensive school surveys or they may be independent in nature. Questionnaire, checklist, score card or observation are usually employed as tools for collecting data in such studies.

***Organization of school surveys:***

The school survey, according to Monly (1963, p. 311) can be conducted in one of the given three ways: (i) by outside consultants (the consultant survey); (ii) by the personnel of the local school system (the self survey); or (iii) by a comprehensive group consisting of local teachers, interested members of the community, and resource persons, headed by an expert acting as consultant and survey leader (the comprehensive survey).

***The consultant survey:*** The consultant survey is conducted by the experts or specialists outside the school. It is useful when the teachers of the school are unable to cope with a problem or when the problems are so comprehensive that they create an overburden on the teachers. The consultant conducting the survey has an advantage in that he can see the school in the light of his previous experience in similar schools. He is more objectives and alert to the problems that may have become ‘blind spots’ to those in the school system. The consultant frequently can command more prestige and respect by virtue of being an outsider. He usually has highly specialized training in research and, hence, undoubtedly he is a capable person to conduct a survey meaningfully and profitably.

The consultant survey is, however, subject to certain limitations. Since a survey generally is of comprehensive nature, a large number of weakness in the school system will probably be found. Anticipating this, the personnel in the system are reluctant to cooperate in the discovery of their weakness. Furthermore, the teachers and other personnel have almost no active participation in the survey, they are likely to be only mildly enthusiastic in implementing its recommendations.

***The self survey:*** The self survey is usually conducted by the teachers of a local school system. This method is subject to certain serious limitations. The teachers generally lack the insight into the true nature of their problems and the necessary competence to deal with them. Furthermore, the teachers are so close to their own problems that at times they consider them so trivial in nature that they are no longer considered problems, or so ingrained that they are

considered beyond solutions. The conduct of self surveys add more responsibilities and extra work to the teachers who are already over burdened with their routine teaching work and, hence, they are more likely to resent the extra work than they are to look for the solution of the problems.

***The comprehensive survey:*** In view of the limitations of the consultant survey and the self survey, the comprehensive survey is regarded as the best approach to school evaluation. In this method, the school supplements its own personnel by enlisting the cooperation of teachers from neighbouring schools, interested leaders of the community, and specialists from the universities and other institutions.

The comprehensive survey method has several psychological, academic and administrative advantages. The participation of teachers in the survey helps in identifying the problems of the school as well as in the implementation of the recommendations. Furthermore, the active involvement of selected and interested community leaders promotes community good will by acquainting its members with the philosophy of the school, its problems, and the limitations under which it functions. The specialists from the neighbouring university with their highly specialized training in research and wide experience frequently bring a fresh approach to the problems of school.

**2. Job analysis:** The method of job analysis is generally used in business and industry. In education, it is employed to gather information about the general duties and responsibilities of the teaching, non-teaching and administrative personnel, the specific duties that they perform, their working conditions, the nature and type of their facilities, and their status and relationship in the administrative organization. The data about the education, specialized training, experience, skills, habits, health standards, and behavioural traits of these personnel are also collected. These data help researchers to get knowledge about the existing practices and conditions of employment, and the competencies and behavioural traits that the personnel possess or should possess to carry out their work effectively and efficiently.

The researchers make use of various tools and techniques to collect objective and reliable data while undertaking job analysis. They may inter-view workers to seek information concerning the nature of their duties, training, or professional activities. They may make use of a checklist compiling the broad functions involved in administrative, supervisory, or teaching positions.

**3. Public opinion surveys:** In order to make some important and crucial decisions, industrial, political, educational and other leaders seek knowledge of the public's opinions, attitudes, and preferences. Educationists, for example, conduct public opinion surveys to find out how people feel about school issues. Business firms make public opinion surveys to find what type of products, packaging, or advertising appeals to purchasers. Politicians conduct opinion surveys to ascertain how people will vote or what programmes they favour.

In public opinion surveys, the researchers usually make use of questionnaires, schedules or interviews to gather data from the selected group or groups following appropriate sampling procedures.

Public opinion surveys have several limitations. At times, the data are collected from a readily available group of people which may not always reflect the opinion of the total population. The situations and the environment in which the study is conducted may also affect the reliability of the data. Furthermore, it is difficult to measure the intensity or depth of opinion in such surveys.

**4. Social surveys:** Social surveys are also called community surveys. These surveys, while essentially the same from the stand point of the research procedures involved, differ from the school surveys in that they are more general and comprehensive. Since school is one of the many agencies whose function is vital to community welfare, social surveys may include data concerning schools, and conversely school surveys may analyze many aspects of the society or community. The social surveys are of great benefit to the school in clarifying the social setting in which they exist and function and the expectations of the community with respect to the education of its citizens.

Social surveys are generally undertaken to study health services, employment conditions, causes of juvenile delinquency, housing problems, or caste discriminations. Such surveys can be conducted by the state or local government, by local community leaders independently of the government, or by a group of experts financed by the government or some other agency.

Researchers who conduct social surveys employ research methods from various fields and gather information concerning many factors that contribute to the character of the community life. They make use of research tools like questionnaires, schedules, interviews, rating scales, and direct observation as well as statistical, ecological and other techniques to gather data

from government officials, social agencies, community leaders, schools and other educational institutions, students and teachers, and various documents.

#### **4.6.2 INTERRELATIONSHIP STUDIES:**

Some researchers in the field of education do not merely gather facts to obtain an accurate description of existing phenomena, they attempt to trace relationships between facts that will provide deeper insight into the phenomena. The studies that endeavour to discover relationship between various facts of the existing phenomena are called as interrelationships studies. These include: (1) case study; (2) causal-comparative studies, (3) correlation and prediction studies, (4) cross cultural and comparative studies.

1. **Case study:** The typical case study is an intensive investigation of a social unit. The social unit may be an individual, a family, a school, a group of delinquents, dropouts, or any teenage gang. In a case study, the researcher attempts to examine an individual or unit in depth. He gathers pertinent data about the present status, past experiences, and environmental forces that contribute to the behaviour of the individual or social unit, and how these factors relate to one another. The analysis of the factors and their interrelationships, help the researcher to construct a comprehensive and integrated picture of the unit.
2. **Causal-comparative studies:** In some investigations, the researcher attempts to explore not only what a phenomenon is like, but how and why it occurs. In such cases, the aim of the researcher is to compare the likeness and differences among phenomena to discover what factors or circumstances seem to accompany or contribute to the occurrence of certain events, conditions or practices.
3. **Correlation and prediction studies:** Correlation studies are a frequently used types of descriptive research concerned with determining the extent of relationship existing between variables. They are used to obtain description of existing phenomenon and enable a researcher to ascertain the extent to which variations in one variable are associated with variation in another. The magnitude the relationship is determined through the use of the coefficient of correlation. For instance, on the basis of earlier studies a researcher may hypothesis that there is a relationship between performance on an intelligence test and a test of achievement in arithmetic. The correlation technique will

help him to test his hypothesis about the relationship between these two variables as well as to assess the magnitude of the relationship.

4. **Cross-Cultural and Comparative Studies:** In cross-cultural and comparative studies the aim of the researcher is to make explicit comparisons of a number of societies. These studies make an important contribution to our understanding of educational and social phenomena, for they seek to demonstrate whether findings concerning human behavior are valid for all human beings or are confined to one culture. Early examples of cross-cultural and comparative studies include development of laws of marriage and descent, relationships between certain social institutions and stages of economic development, relationship between education and society and constructs relating to kinship derived from evolutionary theory. However, these studies made use of the data that were collected in an uncritical and unsystematic manner. With the growth of social sciences in the late nineteenth century, the dynamic relationship between education and society was recognized. Behaviourists emphasized the importance of many cross-cultural studies relating to education. Anthropologists studied the relationship between child-training practices in various countries and cultures, the inculcation of moral values, the development of guilt, and the frequency of occurrence of crime.

#### **4.6.3 Developmental Studies:**

It is important for the educators and teachers to have reliable information about physiological, intellectual, and emotional growth of children at various ages, how they differ from one another within certain age levels, and how they change as a result of certain treatments. Such types of information are useful in taking decisions about the type of curriculum, textbooks and teaching methods. Developmental studies are used for investigating the characteristics change with growth and development. Such studies are concerned not only with the present status and interrelationships of phenomena but also with changes that take place as a function of time. Developmental studies are also called as genetic studies. The genetic or developmental studies may take three different forms - growth studies, follow-up studies and trend studies.

#### **4.7 STEPS IN DESCRIPTIVE RESEARCH:**

The process of descriptive studies is not different from other forms of research. Since such studies, describe and interpret what conditions or relationships exist at present, the researcher may adopt the following steps:

➤ **Selection of the Problem:**

A researcher may be concerned with conditions or relationships that exist, practices that prevail, beliefs, points of view or attitudes that are held, processes that are going on, effects that are being felt or trends that are developing, and may select the problem accordingly from the area or field in which he is interested.

➤ **Statement and Definition of the Problem:**

The researcher must state the problem clearly as it is done in case of other types of research. The statement must identify the variables involved in the study. It should specify clearly whether the study is merely seeking to determine the present status of these variables or whether it will also explore relationships between the variables.

➤ **Identification of Data:**

After stating and defining the problem, the next step for the researcher is to list the data to be collected for the study. He has to specify whether the data is of qualitative or a quantitative nature and whether the data will be collected in the form of counts, test scores, responses to questionnaires, interviews, and so on.

➤ **Selection or Development of Tools:**

The nature of the data to be collected helps the researcher to select the appropriate tools for the study. If the ready-made tools are not available, the researcher has to develop his own tools. Questionnaires, interviews, psycho-logical tests, rating scales, schedules and attitude scales are the most frequently used tools for descriptive research. If the researcher uses ready-made tools, he should satisfy himself about their reliability, validity, and suitability for sample chosen for the study. If the researcher develops his own tools, he should try them out with a small group in order to evaluate them and make modifications if necessary.

➤ **Selection of the Sample:**

The researcher must select the sample about which he wishes to seek information using appropriate sampling techniques. The sample selected should adequately represent the population.

➤ **Collection of Data:**

The researcher should specify the practical schedule for gathering the data from the sample selected for the study with the help of appropriate tools.

➤ **Analysis and Interpretation of Data:**

The data collected is quantified in the form of counts, test scores, responses to questionnaires, etc. These are analysed and interpreted with the help of appropriate parametric or non-parametric statistical tests and qualitative techniques

➤ **Writing of the Research Report:**

It is the last stage in the descriptive research as in any other form of research. The researcher should exercise extreme caution in generalizing conclusions and reporting them with all the limitations of the study.

**Self Assessment Questions**

Q.5. What type of descriptive research studies large groups using questionnaires?

Q.6. What type of research involves an in-depth study of an individual or institution?

Q.7. What type of descriptive research studies relationships between variables?

Q.8. What type of research compares two or more groups?

Q.9. What type of research studies growth and change over time?

Q.10. What is the first step in descriptive research?

Q.11. What is the step in which research goals are clearly stated?

**Check Your Progress**

Q.1. Describe the nature of descriptive research.

Q.2. Compare the descriptive method with the historical method of educational research.

Q.3. Describe the value of descriptive research in education.

Q.4. List and describe the various types of descriptive research.

Q.5. Describe the nature of survey studies.

#### 4.8 Summing Up

- The descriptive method of educational research is a systematic approach used to study and describe the present conditions of educational phenomena. It focuses on “what exists” in the current educational setting, such as students’ performance, teachers’ attitudes, classroom practices, school administration, or educational facilities. This method collects data through tools like surveys, questionnaires, interviews, observations, and tests. It does not attempt to manipulate variables but aims to present an accurate and factual picture of the existing situation.
- The descriptive method is fact-finding, systematic, and objective in nature. It studies variables as they naturally occur in real-life educational settings. It is generally non-experimental and may involve qualitative, quantitative, or mixed approaches. The researcher carefully observes, records, analyzes, and interprets data to ensure validity and reliability. It helps in identifying patterns, trends, and relationships without establishing cause-and-effect relationships through experimentation.
- Descriptive research includes several types depending on its focus and procedure. Survey research studies large groups through questionnaires or interviews. Case study involves an in-depth investigation of an individual, group, or institution. Correlational research examines relationships between two or more variables. Comparative research compares different groups or situations to identify similarities and differences. Developmental research studies growth and changes over a period of time.
- The descriptive method follows a systematic procedure. First, the researcher identifies and defines the problem clearly. Second, objectives and research questions are formulated. Third, appropriate tools and techniques for data collection are selected. Fourth, data are collected from the selected sample. Fifth, the data are organized, analyzed, and interpreted using suitable methods. Finally, conclusions are drawn and findings are reported in a clear and organized manner.

#### **4.9 Answer to Self Assessment Questions:**

Answer to Q. No.1: Descriptive

Answer to Q. No.2: Present

Answer to Q. No.3: Survey

Answer to Q. No.4: Objective

Answer to Q. No.5: Survey

Answer to Q. No.6: Case

Answer to Q. No.7: Correlational

Answer to Q. No.8: Comparative

Answer to Q. No.9: Developmental

Answer to Q. No.10: Problem

Answer to Q. No. 11: Objectives

#### **4.10 References and Suggested Readings:**

- Best, J. W., & Kahn, J. V. (2016). *Research in education* (10th ed.). Pearson Education.
- Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education* (8th ed.). Routledge.
- Kothari, C. R., & Garg, G. (2019). *Research methodology: Methods and techniques* (4th ed.). New Age International.
- Sharma, R. A. (2017). *Fundamentals of educational research and statistics*. R. Lall Book Depot.
- Singh, Y. K. (2011). *Fundamentals of research methodology and statistics*. New Age International.
- Aggarwal, Y. P. (2008). *Statistical methods: Concepts, application and computation*. Sterling Publishers.

---x---

## UNIT- 5

### THE EXPERIMENTAL METHOD OF EDUCATIONAL RESEARCH –NATURE AND STEPS

#### Unit Structure:

- 5.1 Introduction
- 5.2 Objectives
- 5.3 Meaning of Experimental Research
- 5.4 Nature of Experimental Research
- 5.5 Value of Experimental Research
- 5.6 Steps in Experimental Research
- 5.7 Summing Up
- 5.8 Answer to Self Asking Questions
- 5.9 References and Suggested Reading

#### 5.1 INTRODUCTION:

The Experimental Method is one of the most scientific and systematic methods of research. It is used to establish a cause-and-effect relationship between variables. In this method, the researcher deliberately manipulates one variable (independent variable) to observe its effect on another variable (dependent variable), while keeping other variables under control.

The experimental method has its roots in the work of scientists like Wilhelm Wundt, who introduced laboratory experiments in psychology, and Francis Bacon, who emphasized empirical and scientific investigation. Today, it is widely used in education, psychology, medicine, and social sciences.

#### 5.2 OBJECTIVES:

After going through this unit you will be able to

- *discuss* the meaning, nature and value of Experimental method of educational research;

- *know* the types , steps of Experimental method of educational research.

### **5.3 MEANING OF EXPERIMENTAL RESEARCH:**

The experimental method is usually taken to be the most methodical of all methods, the 'method of choice. The major difficulty with all the non-experimental methods is lack of control over the condition. The experimental method is a means of trying to defeat this problem. The experiment is sometimes described as the foundation stone of behavioural science particularly in psychology: This is partially due to the vital role experiments play in many of the physical sciences and also to psychology's historical vision of itself as a science. A substantial amount of psychological research uses the experimental method.

An experiment is a study of cause and effect. It differs from non-experimental methods in that it involves the purposeful treatment of one variable, while trying to keep all other variables stable.

### **5.4 NATURE OF EXPERIMENTAL RESEARCH:**

In descriptive research, a researcher may analyse the data he has collected and discovers that different variables are related. The relationships between the variables can be interpreted in several ways. The researcher interprets his finding in one way and faces difficulty in eliminating plausible alternate explanations of his findings because of the lesser control over the factors studied. Experimental method, on the other hand, provides for much control and, therefore, establishes a systematic and logical association between manipulated factors and observed effects. The researcher defines a problem and proposes a tentative answer or hypothesis. He tests the hypothesis and accepts or rejects it in the light of the controlled variable relationship that he has observed.

The earlier assumptions of experimental method are based upon the law of the single variable. John Stuart Mill (1846) defined this law in his work *Methods of Experimental Inquiry*. He stated five canons or rules of experimental research: (1) the method of agreement, (2) the method of difference, (3) the joint method, (4) the method of residues, and (5) the method of concomitant variations. These rules served as chiefly as guides in the design of early experiments and are now used chiefly as guides in the planning of experiments. The human events are complex and rarely are they the result of restricted relationship between

single variables. They are usually the consequence of the interaction of many variables. Since the law of single variable assumes a highly artificial and restricted relationship between single variables, it failed to provide an adequate approach to experimentation for the study of human beings in the laboratory. Moreover, for various reasons it was not always possible or convenient to study human beings in the laboratory. Certain non-laboratory techniques were, therefore, devised for observing human beings experimentally in groups outside the laboratory. The contributions of R.A. Fisher in terms of his concept of achieving pre-experimental equation of conditions through random selection of subjects and random assignment of treatments have provided an effective and sound method of conducting realistic experiments with human beings. His techniques of analyses of variance and covariance made it possible to study complex interactions through factorial designs. There are four essential characteristics of experimental research: (i) Control; (ii) Manipulation; (iii) Observation; and (iv) Replication.

### **1. Control:**

Control is the essential ingredient of experimental method. It refers to the extent to which different factors in an experiment are accounted for. Since more of the factors are accounted for with accuracy and more control is being enforced, the researcher has more confidence that his results are dependable.

Van Dalen (1973, pp. 263-264) has pointed out that in an experiment, the researcher seeks to control variables for the following purposes:

#### ***i. Achieving Isolation:***

To prevent a factor other than the independent variable from affecting the dependent variable, the researcher may remove the unwanted or interfering variable, or he may keep constant its effect or equalize its presence in the experimental and control groups.

#### ***ii. Achieving Changes in Magnitude:***

A research may strive not only to isolate the independent variable but also to ascertain how much effect it contributes. To achieve this objective, he must be able to vary the magnitude of the experimental variable.

#### ***iii. Achieving Quantitative Evaluation:***

The ultimate goal of a researcher is to express the magnitude of the variable in quantitative terms. He wants to know not merely that one expression of a variable is larger or smaller than

another but precisely how much larger or smaller it is. If two variables are functionally related, he wants to state not merely that they are positively or negatively related but rather the specific degree of relationship in terms of some numerical value. High degrees of control is much easier to achieve in the laboratory setting than in the situations outside the laboratory. In the laboratory, the researcher deals with a limited number of factors and he can manipulate the conditions at will. He can be sure of the changes that have taken place and within a limited amount of time he can measure the effects with great precision.

➤ *Methods of Control*

As discussed earlier, the main purpose of control in an experiment is to arrange a situation in which the effect of variables can be measured. Since human nature is complex, there are many variables present while dealing with human beings in an experimental setting. The attempt of a researcher to reduce educational problems to the operation of a single variable is, therefore, not only unrealistic but impossible.

For the sake of illustration, suppose a researcher wishes to study the effectiveness of conventional method and programmed instruction in teaching of algebra. For this he has to frame two groups of subjects who are identical in every respect except the way in which they are taught algebra. Since it is impossible to have two absolutely identical groups of subjects, the researcher will try to establish two groups that are as identical as possible in respect to those variables that are related to the achievement in algebra. For this he may select the variables of general intelligence, aptitude in mathematics, achievement motivation, and the like. He can easily ignore the variables that are highly unrelated to achievement in algebra. Since the law of a single variable cannot be applied absolutely, the re-searcher will seek to follow it as strictly as possible in all relevant variables.

In experimental studies in education the researcher has, therefore, to direct his effort towards controlling the variables which are significantly related to the dependent variable. Such variables are responsible for any relevant pre-existing differences between the subjects used in the experiment. In addition to inter-subject differences, there are some situational variables that might operate in the experimental situation itself. If the relevant and situational variables are not controlled in an experiment, the researcher cannot be sure whether these are the independent variables or the incidental differences operating in the groups that are producing

the difference in the dependent variable. Various methods which are commonly used to control inter-subject differences and situational variables are discussed as under.

➤ ***Methods for Controlling Inter-subject Differences***

Following procedures are commonly used to minimize inter-subject differences so as to increase equivalence among groups that are to be subjected to various experimental conditions.

1. ***Random assignment of subjects to groups.*** Randomization is based on probability theory. It is considered the best technique of attaining experimental equivalency.

Randomization is not a haphazard or arbitrary method of assigning objects of a universe to subsets, it is a scientific and systematic procedure.

In the preceding illustration, suppose a researcher has available, a group of subjects from which he has to select some number for experimentation. The selected number of subjects will be divided into two groups for different treatments and comparison. In assigning subjects to two groups, the researcher may use the method of randomization to avoid the introduction of biases due to personal judgement and of the characteristics of the subjects themselves.

To obtain two random groups, one to be taught through conventional method and the other through programmed instruction, the researcher could give a serial number to all of the available subjects and employ tables of random numbers, or use some other known random procedure to select needed number of subjects for the two experimental treatments. Similarly, he could assign teachers, classrooms, equipment, and class periods strictly on a random basis. Then with the help of appropriate statistical Tests, the researcher would decide whether the observed difference in the achievement in algebra is sufficiently larger than what would be expected from sampling error. It may be noted that in assigning subjects randomly to two groups, one can assume that the groups are comparable at the start of the experiment on the dependent variable as well as on the extraneous variable. Ary et al (1972, p. 222) have pointed out that through randomization of subjects not only these extraneous variables, that a researcher can identify, are randomized out but also other relevant extraneous variables, which are unknown to him, can be expected to randomize out.

2. **Matching subjects with random assignments.** Another method that is used for assigning subjects to groups is to match individual subjects on as many extraneous variables as a researcher can identify that might affect dependent variable and then apply some random technique to assign one member of each matched pair to the experimental conditions.

The re-researcher, for example, in the preceding illustration may match the subjects on the pre-achievement scores in algebra and/or any other variables that are known to have an effect on the dependent variable, such as scores on an intelligence test or an aptitude test in mathematics, achievement motivation test, or socio-economic background. Then one member of each pair is randomly assigned to the two groups.

The researcher may be encountered with several difficulties. The first and the important of these is to determine what variable or variables are significantly related to the dependent variable and which of these to use as a basis for matching. Variables such as intelligence, socio-economic status, sex, age, achievement motivation, pretest scores on the dependent variable, etc. are commonly used as the basis for matching. The experts are of the opinion that the variables on which subjects are matched must correlate as high as 0, 50 or more to the dependent variable.

Another problem that may be faced by the researcher is how closely to match the subjects on the variable or variables. If he matches the subjects closely, it increases the precision of the method at the cost reducing the size of sample and increasing sampling bias into the study.

Generally three matching procedures are used in experimental studies. Keeping in view this situation, the researcher must decide what matching procedure is feasible in a particular situation.

- i. ***Procedure of subject-to-subject matching:*** In subject-to-subject matching, the researcher seeks to locate two members from the available subjects who score within the limits decided upon by him. For the sake of illustration, suppose the researcher selects socio-economic back-ground as the matching variable, then he may identify two subjects who are within 3 points of each other on the socio-economic status scale, and then randomly assigns one member of the pair to one group and the other member to the other group. It is always possible to match subjects on one variable. However, if there are other two or more relevant variables, then it becomes extremely difficult for the researcher to find pairs who match on all such variables and, therefore, most of the subjects are not selected for the study.
- ii. ***Matching for mean and standard deviation:*** To overcome the problems of subject-to-subject matching, sometimes it is worthwhile to match groups rather than individuals on the relevant variable or variables. The researcher seeks to show that the two groups do not differ significantly in terms of mean and standard deviation on the matching variable

or variables. For example, in an experimental study, intelligence, socio-economic status and achievement motivation were considered the relevant matching variables. In such a study, the researcher may analyse the scores on intelligence test, socio-economic status scale and achievement motivation test, and try to find out that there is no significant difference in the means and standard deviations of the scores on the selected tests. He then randomly assigns the groups to two experimental conditions. Some experts are of the opinion that matching on the basis of groups is less precise in comparison to individuals matching. Moreover, the researcher may feel the problem in identifying the groups that match on all of the variables that may be correlated with the dependent variable.

- iii. ***Ranking of subjects on the matching variable:*** A third method of matching is to place all the available subjects in rank order on the basis of their scores on the matching variable. Regardless of the actual difference, the first two subjects are selected from the rank order list and these constitute the first pair. One subject of this pair is then randomly assigned to one of the groups and the other to the second group. Similarly, the next two subjects on the rank order list are chosen and again one is randomly assigned to the first group and the other to the second group. This procedure is continued until the whole list of subjects is exhausted. This method is also less precise than that of the subject-to-subject matching.
3. **Random assignment on the basis of homogeneous selection.** Another procedure that is used to make groups comparable on an extraneous variable is to select groups, that are as homogeneous as possible on that variable. For example, if a researcher is confident that sex is a variable that might affect the dependent variable, then he could select subjects of a particular sex. By selecting only male students, for example, the researcher would control the effects of sex as an extraneous variable. Similarly, if socio-economic status is likely to be a variable that may affect the dependent variable, the researcher could select subjects within a restricted range of socio-economic status. By this method the researcher is able to control the effects of socio-economic status. After selecting the subjects from the homogeneous population, the researcher could randomly assign subjects to two groups and be confident that the groups were comparable on the relevant variable. Although the selection of subjects from the homogeneous group is useful in eliminating the problems of subject-to-subject matching, it has the disadvantage of decreasing the extent to which the results can be generalized beyond some situations. If a researcher

studied teaching behaviour of a group of in-service teachers of a particular age-range or sex, he could not generalize from the findings of this study the teaching behaviour of in-service teachers of other age or sex. For such generalizations he would have to repeat studies with teachers from other sex or different age ranges.

4. Technique of analysis of co-variance. Because of the problems of the matching procedures discussed earlier, the technique of analysis of co-variance is used to control the variation within the groups. This technique analyses the differences between the two groups, subjected to the two different experimental treatments, on the dependent variable after taking into account any initial difference between the groups on pretest measures or any other relevant independent variables.

In the analysis of co-variance, one or more co-variates, in addition to the dependent variables are measured. A co-variate is a variable that the researcher has not been able to control in the experiment and is believed to affect the dependent variable. The technique of analysis of co-variance is not limited to the use of only one co-variate.

5. Method of using subjects as their own controls. Another method of control is to assign the same subjects to two experimental treatments and then to obtain measurements of the subjects first under one treatment and then under the other. Although this method is an efficient method of control, it is not feasible in certain circumstances. A researcher, for example, is interested to know the difference in learning time between two different lists of nonsense syllables-one list with high association value and the other with low association value in an experiment on retention. In such an experiment, the researcher can find the difference in learning time between two lists for each subject and then test the average difference in learning time for all subjects with the help of an appropriate statistical test for significance. But the effects of relative ease of learning the two lists, fatigue, and other interference effects cannot be partialled out completely and no reliable conclusions could be drawn. Moreover, in some studies the researcher while exposing the subjects to one experimental condition could not use them for the other experimental condition. In teaching some material with two different methods, for example, a researcher cannot teach them with one method and then make them to forget what they learnt and teach them with another method.

#### ➤ **Methods for Controlling Situational Variables**

There are three methods commonly used to control situational variables.

1. ***Method of holding situational variables constant:*** In the method of holding situational variables constant, the researcher treats all the available subjects alike except for their exposure to the independent variable. For example, in a reading experiment the researcher may take equal number of subjects in two groups, teacher them by the same teacher, use the same instructions, apparatus, and tests. The groups may be taught in the same classroom and at the same time of the day, and in the same environmental conditions such as temperature, presence or absence of distracting noise, furniture in the room and the like.
2. ***Method of randomization:*** If the situational conditions cannot be treated alike, the researcher should try to balance them by randomization. Suppose in the study mentioned above it is not possible to have the same teacher for both the groups. The researcher may divide the two major groups into two smaller sub-groups and randomly assigns half subjects of the first major group and half subjects of the second major group to each teacher. The same procedure could be used to randomize other situational variables like time, apparatus and tests.
3. ***Method of manipulating situational variables:*** The situational variables can also be controlled by manipulating them systematically. In some educational experiments, the researcher can use a sequence of experimental and control conditions in order to control what Ary et al. (1972, p. 227) have called ‘progressive effects’, like those of practice and fatigue. This, according to them can be done by “controlling the order in which experimental conditions are presented through a counter-balancing, half the sub-jects may receive an AB order and the other half a BA order.” The authors are of the opinion that this method not only controls the potentially contaminating effect of order, but can also help in providing an estimate of the size of the order effect by finding whether the means of 4 and 8 values obtained in the two sequences are different.

### **Manipulation:**

Manipulation of a variable is another distinguishing characteristic of experimental research. It refers to a deliberate operation of the conditions by the researcher. In contrast to descriptive research, in which the re-searcher simply observes conditions as they occur naturally, the researcher in the experimental research actually sets the stage for the occurrence of the factor whose performance is to be studied under conditions in which all other factors which might

complicate the observation are controlled or eliminated. In the process of manipulation, a pre-determined set of varied conditions are imposed on the subjects selected for the experiment. The set of varied conditions is referred to as the independent variable, the experimental variable, or the treatment variable. The independent variable may assume two or more values and the differences in the values may be of qualitative or quantitative nature. Sex, methods of teaching, attitudes, socio-economic status, classroom environment, personality characteristics, types of motivation, etc. are some common examples of independent variables in educational research.

If the researcher compares the performance of male and female students, sex is the independent variable. If he compares two methods of teaching, method of teaching is the independent variable and can be manipulated by the teacher. Since sex in the former case cannot be manipulated, it is called an 'assigned independent variable'. The researcher may manipulate a single variable or a number of variables simultaneously. He must get an expertise in the technique of 'multivariate analysis' so as to save time and energy in the simultaneous investigation of a number of variables studied singly and in interaction.

### **Observation:**

In the experimental research, the researcher studies the effect of the manipulation of the independent variable on a dependent variable. The dependent variable, for example, may be learning some task. Since learning cannot be measured directly, the researcher can only estimate it through such measures as scores on a test. Strictly speaking dependent variable, therefore, is scores on a test or observations with respect to some characteristics of the behaviour of the subjects used in the experiment.

### **Replication:**

No matter how objectively and carefully a researcher attempts to control the extraneous variables through the methods of randomization or other methods, still some discrepancies invariably remain and influence the results of the experiment. The researcher can take care of such discrepancies through the replication of the study.

Replication is a matter of conducting a number of sub-experiments within the framework of an overall experimental design. The researcher, instead of comparing a single control case

with a single experimental case, makes a multiple comparison of a number of cases of the control group and a number of cases of the experimental group, all within the same experimental framework. He assigns equivalent subjects to each of the control and the experimental groups at random and thus considers the comparisons of each pair as an “experiment” in itself (Mouly, 1963, p. 337). If a researcher, for example, conducts an experiment, involving 30 subjects in each of the experimental and control groups, he is actually conducting thirty parallel experiments in one. In some experimental situations, a number of control and experimental groups, each consisting of equivalent subjects assigned at random to one or another of the two groups are combined within the design of a single experiment.

### **5.5 VALUE OF EXPERIMENTAL RESEARCH IN EDUCATION:**

The experimental research is not considered a precise method of research in the field of education because of the complex nature of the human beings and problems of controlling the extraneous variables. However, in spite of all such difficulties, experimentation has been put to various uses in solving educational problems. Campbell and Stanley (1963) are of the opinion that:

The experiment is the only means for settling disputes regarding educational practice, the only way of verifying educational improvements, and the only way of establishing a cumulative tradition in which improvements can be introduced without the danger of a faddish discard of old wisdom in favour of inferior novelties.

Experimental research is used to determine and evaluate the adequacy and effectiveness of the educational and instructional objectives through the measurement of their outcomes. After evaluating the efficacy of objectives, the suggestions are made for the formulation, execution and modification of educational programmes and classroom practices. The classroom teacher uses experimentation to evaluate the effectiveness of certain learning experiences, planned and organized, to achieve some desired objectives. Effectiveness of teaching methods and innovations in the evaluation techniques is also ascertained through experimental research.

### **5.6 STEPS IN EXPERIMENTAL RESEARCH:**

The steps of the experimental method are not different from those of a scientific method. For the sake of clarification, the major steps may be described as under:

➤ ***Surveying the Literature Relating to the Problem:***

For a worthwhile research based on experimentation, the researcher like in any other type of research, needs to acquire up-to-date information relating to his problem. The sources and the procedures are helpful to acquaint the researcher with adequate related literature.

➤ ***Selecting and Defining the Problem:***

Experimental research starts with the selection of the problem which is amenable to experimentation. It needs a rigorous logical analysis and definition of the problem in precise terms. The variables to be studied should be defined in operational terms clearly and unambiguously. It helps the researcher to convert the problem precisely into a hypothesis that can be verified or refuted by the experimental data.

➤ ***Stating of Hypotheses:***

The stating of problem hypotheses is one of the distinguishing characteristics of experimental method. Hypotheses are the heart of experimental research. They suggest that an antecedent condition or phenomenon (independent variable) is related to the occurrence of another condition, phenomenon, event, or effect (dependent variable). To test a hypothesis, the researcher attempts to control all the conditions except the independent variable which he manipulates. Then he observes the effect on the dependent variable presumably because of the exposure to the independent variable. The researcher, therefore, should not only be concerned primarily with experimental plans and statistical procedures, but should give sufficient attention to the formulation of hypotheses. The experimental plans and statistical procedures merely help him in the testing of hypotheses and contribute little in the development of theories or advancement of knowledge. The hypotheses developed or derived from existing theories, however, contribute to the development of new theories and knowledge.

➤ ***Constructing the Experimental Plan:***

Experimental plan refers to the conceptual framework within which the experiment is conducted. According to Van Dalen (1973, p. 260) it represents all elements, conditions or phenomena, and relations of consequences so as to:

- i. identify all non-experimental variables that might contaminate the experiment and determine how to control them;
- ii. select a research design;

- iii. select a sample of subjects to represent a given population, assign subjects to groups, and assign experimental treatments to groups;
- iv. select or construct and validate instruments to measure the outcomes of the experiment;
- v. outline procedures for collecting data and possibly conduct a pilot or 'trial run' test to perfect the instruments or design; and
- vi. state the statistical or null hypothesis.

The identification of non-experimental or extraneous variables and the procedures for controlling them have already been discussed earlier in this chapter. In order to select a suitable research design for conducting the experiment and assign subjects to different experimental treatments to measure the outcomes of experiment, the researcher must be well acquainted with different types of experimental designs.

#### **Self Assessment Questions**

- Q.1. Experimental method is \_\_\_\_\_ in nature.
- Q.2. What is the relationship studied in experimental research?
- Q.3. What is the variable that is measured?
- Q.4. Experimental method is conducted under \_\_\_\_\_ conditions.
- Q.5. What is the first step in experimental research?
- Q.6. What is the selection of subjects called?
- Q.7. Examining the data is called \_\_\_\_\_.

#### **Check Your Progress**

- Q.1. Define the Experimental Method of research and explain its meaning, nature, and steps in detail.
- Q.2. What is meant by the Experimental Method? Discuss its characteristics and describe the procedure involved in conducting an experiment.
- Q.3. Explain the concept of the Experimental Method in research methodology. Highlight its scientific nature and outline its major steps.

Q.4. Discuss the Experimental Method as a scientific approach to research. Describe its meaning, essential features, and systematic stages.

Q.5 What is the Experimental Method of research? Elaborate on its nature and explain the various steps involved in conducting experimental research.

## 5.7 Summing Up

- The Experimental Method is a scientific approach to research used to establish a cause-and-effect relationship between variables. In this method, the researcher deliberately manipulates one variable, known as the independent variable, to observe its effect on another variable, called the dependent variable. It gained prominence through the scientific approach advocated by thinkers such as Francis Bacon and was later strengthened in psychology by Wilhelm Wundt, who introduced laboratory experiments.
- The experimental method is scientific, objective, and systematic in nature. It involves careful planning, manipulation, and control of variables to obtain valid results. One of its essential features is the control of extraneous variables, which ensures that the observed changes in the dependent variable are due only to the independent variable. It is empirical because it relies on observation and measurable data rather than opinion or speculation. The method is also quantitative in approach, as it often uses statistical tools for analysis. Another important characteristic is replicability, meaning that the experiment can be repeated to verify findings.
- The experimental method follows a systematic sequence of steps. First, the researcher identifies and clearly defines the research problem. Next, a hypothesis is formulated to predict the relationship between variables. The researcher then selects and defines the independent, dependent, and control variables. After this, an appropriate experimental design is prepared, and a suitable sample is selected, often using random assignment to form experimental and control groups. The experiment is conducted by administering treatment to the experimental group while keeping the control group unaffected.

### **5.8 Answer to Self Assessments Questions:**

Answer to Q. No.1: Scientific

Answer to Q. No.2: Cause

Answer to Q. No.3: Dependent

Answer to Q. No.4: Controlled

Answer to Q. No.5: Problem

Answer to Q. No.6: Sampling

Answer to Q. No.7: Analysis

### **5.9 References and Suggested Readings:**

- Best, J. W., & Kahn, J. V. (2016). *Research in education* (10th ed.). Pearson Education.
- Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education* (8th ed.). Routledge.
- Kothari, C. R., & Garg, G. (2019). *Research methodology: Methods and techniques* (4th ed.). New Age International.
- Sharma, R. A. (2017). *Fundamentals of educational research and statistics*. R. Lall Book Depot.
- Singh, Y. K. (2011). *Fundamentals of research methodology and statistics*. New Age International.
- Aggarwal, Y. P. (2008). *Statistical methods: Concepts, application and computation*. Sterling Publishers.

---x---

## **BLOCK: 2**

### **REVIEW OF RELATED LITERATURE**

**Unit 1: Review of Related Literature- Purpose, Steps Involved in Review of Related Literature**

**Unit 2: Identification of Review of Literature**

**Unit 3: Organizing the Related Literature**

**Unit 4: Ethical Issues in Social Research**

## UNIT- 1

### REVIEW OF RELATED LITERATURE- PURPOSE, STEPS INVOLVED IN REVIEW OF RELATED LITERATURE

#### **Unit Structure:**

- 1.1 Introduction
- 1.2 Objectives
- 1.3 Concept of Review of Related Literature
  - 1.3.1 Definition of Review of Related Literature
- 1.4 Purpose of Review of Related Literature
- 1.5 Steps involved in Review of Related Literature
- 1.6 Summing Up
- 1.7 Questions and Exercises
- 1.8 Reference and Suggested Readings

#### **1.1 Introduction**

Successful research is based on all the knowledge, thinking, and research that precedes it, and for this reason, a review of the literature is an essential step in the process of embarking on a research study. A review of literature is a summary, analysis, and interpretation of the theoretical, conceptual, and research literature related to a topic or theme. It is broader than a review of the research, which only reviews research literature, and it generally provides the framework for a bridge between a piece of original research and the work that preceded it.

A review of related literature is an integral part of the research process and makes valuable contributions to every operational step. Review of related literature is the prerequisite step for any scientific investigation. It helps the researcher acquire current knowledge in the field of study and proceed in a logical sequence. A review of related literature provides direction and guidance to researchers in order to obtain beneficial outcomes. It provides important suggestions for choosing problems and research techniques. It gives the investigator a better understanding of the work that has already been done on the topic of inquiry and offers recommendations for data collection and result interpretation. It also aids in preventing needless study duplication. It is beneficial to be aware of the suggestions made by earlier

scholars for additional investigation. Through the review, the researcher becomes aware of the methodologies used by earlier researchers, the findings obtained, and the limitations encountered in previous studies.

## **1.2 Objectives**

After the discussion of this unit, the learner will be able to—

- *understand* the concept of the Review of related literature;
- *understand* the Purpose of the Review of Related Literature;
- *know* the different steps involved in the Review of Related Literature.

## **1.3 Concept of Review of Related Literature**

A “review of related literature” (RRL) is a detailed evaluation of existing research and publications pertinent to a certain topic or research question. A literature review is a thorough examination and analysis of published works about a specific research question or topic. An anthology of earlier scientific publications in books, monographs, journal articles, and other formats is called a review of the literature. The initial stage in any scientific investigation is an examination of the literature. Since it encourages creativity, helps formulate significant questions, and is essential to the study design process, working with the literature is truly an essential element in the research process. The methodological identification, location, and analysis of publications containing information related to the research issue constitute the Review of Related Literature. This word also refers to the written portion of a research plan or report that evaluates the publications that were looked at. The literature review fulfills several important purposes, making it well worth the time and effort. The primary objective of examining the literature is to determine what has been done in the past that is relevant to your topic. This material gives you the knowledge and viewpoint you need to arrange your issue rationally, in addition to preventing you from unintentionally replicating someone else’s research.

In addition, reviewing related literature enhances the researcher’s critical thinking and analytical skills. It encourages the comparison and evaluation of different viewpoints, leading to a more refined and focused research approach. A comprehensive review also assists in selecting appropriate research methods, tools, and techniques. Therefore, the review of

related literature is not merely a summary of previous works, but a critical and organized synthesis of existing knowledge that lays the foundation for the present investigation. It plays a vital role in ensuring that the research is meaningful, relevant, and scientifically grounded.

### **1.3.1 Definitions of Review of Related Literature**

The term 'review of literature' has been defined in the following ways:

#### **According to W.R. Borg-**

"The literature in any field forms the foundation upon which all future work will be built. If we fail to build the foundation of knowledge provided by the review of literature, our work is likely to be shallow and naïve and will often duplicate work that has already been done better by someone else."

#### **According to Charter V. Good-**

"The keys to the vast storehouse of published literature may open doors to sources of significant problems and explanatory hypotheses and provide helpful orientation for definition of the problem, background for selection of procedure, and comparative data for interpretation of results. In order to be creative and original, one must read extensively and critically as a stimulus to thinking."

#### **According to John W. Best-**

"Practically all human knowledge can be found in books and libraries. Unlike other animals that must start a new with each generation, man builds upon the accumulated and recorded generation man builds upon the accumulated and recorded knowledge of the past. His constant adding to the vast store of knowledge makes possible progress in all areas of human endeavour."

#### **According to Lokesh Koul-**

"The review of related literature is a survey of scholarly writings, research reports, and other sources relevant to the research problem."

Reviewing the literature has two phases. The first phase includes identifying all the relevant published material in the problem area and reading that part of it with which we are not thoroughly familiar. We develop the foundation of ideas and results on which our own study will be built. The Second Phase of the review of literature involves writing this foundation of ideas into a section of the research and readers. For the researchers, it establishes the

background in the field. For the readers, it provides a summary of the thinking and research necessary for them to understand the study.

**STOP TO CONSIDER:**

- A review of related literature provides direction and guidance to researchers in order to obtain beneficial outcomes.
- It provides important suggestions for choosing problems and research techniques.
- A “review of related literature” (RRL) is a detailed evaluation of existing research and publications pertinent to a certain topic or research question.
- A literature review is a thorough examination and analysis of published works about a specific research question or topic.

#### **1.4 Purpose of Review of Related Literature**

The purpose of a literature review is to convey to the reader previous knowledge, facts established on an issue, and their strengths and weaknesses. Literature review allows the reader to update with the status of the research by allowing them to summarize, evaluate, and compare original research in the field. Some of these purposes may be as follows:

- It helps in identifying research problems and developing and improving research questions. It also helps to develop hypotheses for testing in research studies.
- It projects what is known and not known about the field of research to find out how research can best contribute to that knowledge. Literature review also attempts to describe the strengths and weaknesses of the design/investigation methods and devices used in previous research work, and also shows any gaps or inconsistencies in the body of knowledge.
- It also reveals unanswered questions about topics, concepts, or problems. Similarly, it stimulates the need to replicate previous studies in different study settings, different samples or sizes, or different study populations.
- It provides a relevant theoretical or conceptual framework for research problems, so it helps the researcher identify or develop new or refine the existing theories through empirical research.

- It helps to plan the methodology of existing research studies.
- It also helps in the development of research devices, the identification of suitable designs for research studies, and assistance in data collection methods.
- It is important in interpreting the findings of the study, developing effects, and recommendations. It also points the way forward for further research.

***Bruce W. Tuckman (1978) has enumerated the following purposes of review:***

- Discovering important variables.
- Distinguishing what has been done from what needs to be done.
- Synthesizing the available studies to have a perspective.
- Determining meanings, relevance of the study, and its deviation from the available studies.

***Edward L. Vockell (1983) has pointed out the following two purposes:***

- Primary purpose: The main purpose of this review is to put the hypothesis to be examined in the research report into its proper context.
- Secondary purpose: Secondary purposes of this part of the report are to provide readers with guidelines regarding whether they can look to find more information and to establish the author's credentials by letting readers know that the researcher is aware of what has been going on concerning the current and related topics.

The review of related literature provides some insight regarding the strong points and limitations of the previous studies. It enables researchers to improve their own investigation.

### **CHECK YOUR PROGRESS**

Q.1. What do you mean by review of related literature?

Q.2. Write the definitions of the review of related literature

Q.3. Discuss the purposes of the review of related literature.

## 1.5 Steps involved in Review of Related Literature

### i. Determine the focus of your literature review:

The focus of the literature review should be guided by the thesis statement (the main claim or argument that the researcher plans to make in the paper). Avoid topics that are too broad or too narrow. When the topic is too broad, the researcher may have too much material to work with and find it difficult to create focus in the paper. When the topic is too narrow, the researcher may struggle with finding enough literature to review.

### ii. Find literature to review that is related to the research topic:

This can include books, journal articles, news articles, websites, etc., depending on the research topic. Literature reviews typically include secondary sources rather than primary sources (e.g., if the researcher is writing a paper about the Declaration of Independence, the researcher's literature review would include books and articles *about* the Declaration of Independence, rather than the contents of the Declaration of Independence itself). Good places to look for sources are: libraries, online databases, course syllabi, Google Scholar, and the references section of relevant books and articles. Make sure to judge the quality of the sources (e.g., make sure that articles come from reputable journals or that websites are associated with reputable organizations). Wikipedia is not considered a high-quality source, but many Wikipedia articles do have sources listed in the references section that can be useful. If the researcher needs to, make contact with the University Libraries' subject librarians, so they can assist the researcher in locating databases, journals, and articles relevant to the researcher's research.

### iii. Evaluate the contribution of each source:

Determine the main point or argument of each source. Consider how the source relates to the researcher's own research question. Then, determine which sources are most relevant and which sources should be included in the review. Depending on the type of review a researcher is doing, it may not need to include every source found on a given topic, especially if multiple sources make the same or similar point. Consider page and word limits to determine which and how many sources to include. If the researcher is conducting an integrative or systematic review, they will include all sources that fall within their specified research parameters (something that is

determined before they start searching for literature). At this stage, it can be helpful to create an annotated bibliography to keep track of the contributions of different sources.

**iv. Synthesize:**

Determine how the sources relate to each other and to the researcher's own research. Identify common and/or important themes, disagreements, or different points of view among scholars, gaps in the research, and any apparent issues with methodology or conclusions. Create an outline to help organize the ideas before starting writing. The researcher may find that certain sources connect directly, while others have less-obvious links; review the following strategies for grouping and discussing multiple sources.

**Strategies for synthesizing literature:**

- Thematic: Group ideas according to theme. Show how different sources are related thematically. Consider common themes that are addressed in the literature, and how different scholars have approached those themes.
- Chronological: Group ideas by periods of time. Consider how scholarly methods and/or scholarly thinking have changed over time.
- Methodological: Group ideas by method. Identify different methods that have been used to address the issue and consider whether different methods have led to different conclusions.

**v. Write the literature review:**

Start with an introduction that describes the main topic and research question. Use the outline the researcher developed in step 4 as a guide as you write the body of the literature review. Importantly, do not just write an isolated paragraph for each source. Make sure to make connections across different sources to create a coherent discussion on the topic. Conclude by explaining how the researcher's own research question or argument fits into the scholarly discussion. This allows you to create a transition from the literature review to the specifics of your own study if necessary (e.g., methods and analysis).

## 1.6 Summing Up

- Review of related literature is the prerequisite step for any scientific investigation. It helps the researcher acquire current knowledge in the field of study and proceed in a logical sequence.
- The primary objective of examining the literature is to determine what has been done in the past that is relevant to your topic.
- This material gives you the knowledge and viewpoint you need to arrange your issue rationally, in addition to preventing you from unintentionally replicating someone else's research.
- A review of the related literature helps in identifying research problems and developing and improving research questions. It also helps to develop hypotheses for testing in research studies.
- Review of Related Literature provides a relevant theoretical or conceptual framework for research problems, so it helps the researcher identify or develop new or refine the existing theories through empirical research.
- A systematic literature review not only summarizes existing knowledge but also provides direction and justification for the present research.
- The literature review is a systematic and purposeful process that begins with identifying a clear focus and extends through searching, evaluating, synthesizing, and finally presenting the selected studies.
- Each step plays a vital role in ensuring that the review is relevant, comprehensive, and critically grounded.
- By carefully following these steps, the researcher is able to develop a coherent understanding of the existing body of knowledge, identify gaps in research, and establish a strong foundation for the present study.
- Thus, a well-executed literature review not only summarizes past work but also guides and strengthens the direction of the research.

## 1.7 Questions and Exercises

Q.1. Define Review of Related Literature.

Q.2. Explain the concept of literature review.

Q.3. Briefly explain the purposes of Review of Related Literature.

Q.4. Explain the different steps involved in Review of Related Literature.

### **1.8 References and Suggested Readings**

- Best, J. W., & Kahn, J. V. (2006). *Research in Education* (10th ed.). Pearson Education.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). SAGE Publications.
- Kothari, C. R. (2004). *Research methodology: Methods and techniques* (2nd ed.). New Age International Publishers.
- Koul, L. (2019). *Methodology of educational research* (5th ed.). Vikas Publishing House.
- Sharma, R. A. (2008). *Research in education*. Surya Publications.
- Sharma, R.A. *Educational Research*. Vinay rakheja.

---x---

## UNIT- 2

### IDENTIFICATION OF REVIEW OF LITERATURE

#### **Unit Structure:**

2.1 Introduction

2.2 Objectives

2.3 Need and importance of Review of Literature

2.4 Sources of Review of Related Literature

2.4.1 Classification and Categorization of Literature

2.5 Summing Up

2.6 Questions and Exercise

2.7 References and Suggested Readings

#### **2.1 Introduction**

One of the most important steps in the research process is identifying related material, which entails finding and selecting pertinent information sources on the study subject. It provides the basis for creating a thorough and significant review, since the suitability and sufficiency of the identified literature play a major role in the review's quality. Books, Journals, papers, theses, and internet resources are just a few of the many sources of information available for research. But not each source of information is pertinent or helpful for a certain study. As a result, the researcher must carefully find and choose literature that directly relates to the study's goals, variables, and scope. This requires a systematic approach, including the use of appropriate keywords, reliable sources, and well-defined selection criteria. The identification procedure enables the researcher to concentrate on important studies, steer clear of extraneous or irrelevant resources, and guarantee thorough coverage of the research field. Additionally, it helps the researcher comprehend current theories, methods, and results, giving the current investigation a clear path. Finding related literature is, therefore, a critical and selective process that guarantees the quality, depth, and relevance of the literature review rather than just a collection procedure.

## 2.2 Objectives

After the discussion of this unit, the learner will be able to—

- *know* the need and importance of the Review of related literature;
- *know* the different sources of the Review of related literature;
- *understand* the sources of Review of related literature;
- *understand* the categorization of literature review.

## 2.3 Need and importance of Review of Literature

The review of related literature is a fundamental component of any scientific research. It plays an analytical and critical role in enhancing the quality, validity, and relevance of a study. The importance of a literature review can be understood through the following points:

- Provides understanding of existing knowledge:** it helps in interpreting existing literature considering recent developments, thereby ensuring consistency and relevance of knowledge in the field.
- Tracks progress of knowledge:** a literature review enables the researcher to assess the advancement of knowledge and the impact of recent studies in the concerned area.
- Identifies research gaps:** the review helps in identifying unexplored or under-researched areas, which can be further investigated to contribute new knowledge.
- Ensure relevance and coherence:** the literature review ensures that the research is relevant, logically structured, and aligned with the existing body of knowledge.
- Guides further research:** it not only summarizes existing knowledge but also points out areas requiring further investigation.
- Justifies the research problem:** it provides a strong basis for formulating and justifying the research problem and research questions.
- Develops theoretical framework:** literature review helps in constructing a theoretical base by identifying key concepts, models, and theories.
- Helps in methodological selections:** by analyzing previous studies, the researcher can adopt suitable and appropriate research methods and avoid earlier limitations.

- i. **Enhanced interpretations of results:** Findings of the study can be compared with previous research, thereby increasing their significance and validity.

The literature review is not merely a summary of previous studies but a critical and analytical tool that strengthens the foundation of research. It ensures clarity, originality, and scientific validity, making it an essential step in any research process.

#### **STOP TO CONSIDER**

- The review of related literature is a fundamental component of any scientific research.
- A literature review enables the researcher to assess the advancement of knowledge and the impact of recent studies in the concerned area.
- The literature review ensures that the research is relevant, logically structured, and aligned with the existing body of knowledge.

## **2.4 Sources of Review of Related Literature**

### **a) Primary Sources:**

Primary sources are original and first-hand research documents produced by the researcher who conducted the study or developed the theory. These sources present direct evidence, including detailed descriptions of the research problem, methodology, data collection, analysis, and findings. Most primary sources are published in peer-reviewed journals and are considered highly reliable for academic research. A credible literature review primarily relies on sources, as they provide authentic, unaltered information. Primary sources are written by individuals who directly carried out the investigation or contributed original ideas. Therefore, they serve as the most important foundation for research work.

A primary source of literature provides first-hand evidence about an event, object, person, or work of art. Primary sources include historical and legal documents, eyewitness accounts, and results of experiments, statistical data, pieces of creative writing, audio and video recordings, speeches, and art objects. Interviews, surveys, fieldwork, and Internet communications via email, blogs, listservs, and newsgroups are also primary sources. In the natural and social sciences, primary sources are often empirical studies (research where an experiment was performed or a direct observation was made). The results of empirical studies are typically found in scholarly articles or papers delivered at conferences. Many scholarly

journals in the sciences and social sciences include primary source articles where the authors report on research they have undertaken. Films, videos, TV programs, and digital recordings can be primary sources. Documentaries and TV news broadcasts can provide insights into the fantasies, biases, political attitudes, and material culture of the times in which they were created. Radio broadcast recordings, oral histories, and the recorded music of a particular era can also serve as primary source material. Manuscripts and archives are primary sources, including business and personal correspondence, diaries and journals, legal and financial documents, photographs, maps, architectural drawings, objects, oral histories, computer tapes, and video and audio cassettes.

**b) Secondary Sources:**

Secondary sources are documents that describe, interpret, analyze, or summarize the findings of primary sources. These are written by individuals who were not directly involved in conducting the original research. Secondary sources help researchers understand existing studies more easily by providing interpretations, comparisons, and critical evaluations of multiple research works. However, since secondary sources are based on the author's interpretation, there is a possibility of bias or misinterpretation. Therefore, researchers are encouraged to consult primary sources whenever possible to ensure accuracy. Despite this limitation, secondary sources are useful when primary sources are not easily accessible or when researchers need an overview or expert opinion on a topic.

Secondary source materials can be articles in newspapers or popular magazines, book or movie reviews, or articles found in scholarly journals that discuss or evaluate someone else's original research. Journals, magazines, and newspapers are serial publications that are published on an ongoing basis and are regarded as secondary sources of literature. In the humanities, age is an important factor in determining whether an article is a primary or secondary source. If an author is interpreting a historic event, the article will be regarded as a secondary source. An article on the case that was published as far back as 1940 could be regarded as a primary source because it reveals how writers were interpreting the decision immediately after it was handed down. Serials may also include book reviews, editorials, and review articles. Review articles summarize research on a particular topic, but they do not present any new findings; therefore, they are considered secondary sources. Their bibliographies, however, can be used to identify primary sources. Most books are secondary sources, where authors reference primary source materials and add their own analysis.

Books can also function as primary sources. For example, Abraham Lincoln's letters, speeches, or autobiography would be primary sources. To locate primary sources in the library catalogue, do a keyword search and include "sources" in your search. Visual materials such as maps, photographs, prints, graphic arts, and original art forms can provide insights into how people viewed and/or were viewed the world in which they existed.

**c) Tertiary Sources:**

Tertiary sources are those materials that compile, organize, and index information from primary and secondary sources. They do not provide original research or detailed analysis but serve as guides to help researchers locate relevant literature efficiently. These sources are especially useful in the initial stages of research when the researcher is exploring a topic and identifying important studies. Tertiary sources present information in a summarized and structured form, enabling quick access to a large body of knowledge. Although they are not used for in-depth analysis, they play a crucial role in directing the researcher toward appropriate primary and secondary sources.

Tertiary sources include almanacs, chronologies, dictionaries and Encyclopaedias, directories, guidebooks, indexes, abstracts, manuals, and textbooks. Our literature review should be guided by a central research question. Remember, it is not a collection of loosely related studies in a field but instead represents background and research developments related to a specific research question, interpreted and analyzed by you in a synthesized way.

**STOP TO CONSIDER**

- A primary source of literature, provides first-hand evidence about an event, object, person, or work of art.
- Primary sources include historical and legal documents, eyewitness accounts, and results of experiments, statistical data, pieces of creative writing, audio and video recordings, speeches, and art objects.
- Secondary sources are documents that describe, interpret, analyze, or summarize the findings of primary sources.
- Secondary source materials can be articles in newspapers or popular magazines, book or movie reviews, or articles found in scholarly journals that discuss or evaluate someone else's original research.

- Tertiary sources are those materials that compile, organize, and index information from primary and secondary sources. Tertiary sources include almanacs, chronologies, dictionaries and Encyclopaedias, directories, guidebooks, indexes, abstracts, manuals, and textbooks.

### **CHECK YOUR PROGRESS**

Q.1. Discuss the need and importance of Review of Related Literature.

Q.2 Discuss different sources of Review of Related Literature.

## **2.4.1 Classification and Categorization of Literature**

### **a) Thematic Classification**

A thematic literature review offers several significant advantages in organizing and analyzing existing research. By adopting a thematic approach at an early stage, the researcher can systematically categorize the literature according to key issues or themes, thereby gaining a clear understanding of the extent of available studies in each area and identifying the need for further reading. This method facilitates the identification of areas that lack sufficient research, highlights important gaps in the existing body of knowledge, and reveals opportunities for extending previous studies. Furthermore, a thematic organization encourages a more evaluative and analytical engagement with the literature, allowing the researcher to assert their own perspective and establish scholarly authority. It also enables the researcher to actively identify relationships and connections among different studies. By linking these themes to the research problem, a thematic literature review provides the reader with a comprehensive and coherent understanding of the field, enhancing both clarity and depth of analysis.

### **b) Chronological Classification**

In scientific research, the review of related literature occupies a central and indispensable position. It provides a foundation for new knowledge by connecting past studies with present investigations. Among the various approaches to identifying the literature, the chronological literature review is widely used for its systematic and developmental perspective.

In a chronological literature review, studies are generally organized according to the time of their publication. For example, one might begin with British biological studies of the eighteenth century, followed by a discussion of *Moby-Dick* (1851), then proceed to works on sperm whales in art published in 1968, and finally include biological studies from the 1980s along with recent research on nineteenth-century American whaling. However, such an arrangement may lack coherence and continuity, as these works differ significantly in subject matter and focus. Moreover, although some sources are recently published, they often examine phenomena or subjects that originated much earlier. As a result, the review may fail to maintain a true chronological progression of ideas or developments. Therefore, it is essential that a chronological literature review not only follows a time sequence but also preserves thematic continuity to ensure clarity, relevance, and analytical depth.

#### **d) Methodological Classification**

In the classification of the review of related literature, studies can also be organized on the basis of the research methodologies adopted by previous researchers. This is known as methodological classification, where the emphasis is placed not only on what has been studied but also on how it has been studied.

Under this classification, the researcher groups the reviewed studies according to their methodological approaches, such as quantitative, qualitative, and mixed methods research. Further, studies may be categorized based on their research design, data collection techniques, and sampling methods. In addition, attention is given to the tools and techniques of data analysis, including statistical methods and qualitative analytical procedures.

The purpose of including methodological classification in the review is to critically examine the strengths and limitations of different research approaches, identify commonly used methods in the field, and understand trends in research practices. It also helps the researcher to select an appropriate methodology for the present study by learning from previous works. Thus, methodological classification adds depth to the literature review by shifting the focus from mere findings to the process of research, ensuring that the present investigation is methodologically sound and scientifically grounded.

### **STOP TO CONSIDER**

- Literature review can be broadly classified into Thematic, Chronological, and Methodological approaches.
- Thematic review organizes studies based on key themes or issues, helping to identify patterns, relationships, and research gaps within specific areas.
- Chronological reviews arrange studies according to time sequence, showing the evolution and development of knowledge over different periods.
- Methodological review classifies studies based on the research methods and techniques used by researchers.

### **2.5 Summing Up**

- The identification of review of literature procedure enables the researcher to concentrate on important studies, steer clear of extraneous or irrelevant resources, and guarantee thorough coverage of the research field.
- Additionally, it helps the researcher comprehend current theories, methods, and results, giving the current investigation a clear path.
- A literature review enables the researcher to assess the advancement of knowledge and the impact of recent studies in the concerned area.
- Review of related literature not only summarizes existing knowledge but also points out areas requiring further investigation.
- There are different sources of review of related literature, i.e.; Primary Source, Secondary Source and Tertiary Source.
- A primary source of literature, provides first-hand evidence about an event, object, person, or work of art.
- Primary sources include historical and legal documents, eyewitness accounts, and results of experiments, statistical data, pieces of creative writing, audio and video recordings, speeches, and art objects.

- Interviews, surveys, fieldwork, and Internet communications via email, blogs, listservs, and newsgroups are also primary sources.
- Secondary sources are documents that describe, interpret, analyze, or summarize the findings of primary sources.
- Secondary source materials can be articles in newspapers or popular magazines, book or movie reviews, or articles found in scholarly journals that discuss or evaluate someone else's original research.
- Secondary sources help researchers understand existing studies more easily by providing interpretations, comparisons, and critical evaluations of multiple research works.
- Tertiary sources are those materials that compile, organize, and index information from primary and secondary sources.
- Tertiary sources include almanacs, chronologies, dictionaries and Encyclopaedias, directories, guidebooks, indexes, abstracts, manuals, and textbooks.
- Tertiary sources present information in a summarized and structured form, enabling quick access to a large body of knowledge.
- Although tertiary sources are not used for in-depth analysis, they play a crucial role in directing the researcher toward appropriate primary and secondary sources.
- Literature review can be broadly classified into Thematic, Chronological, and Methodological approaches.
- Thematic review organizes studies based on key themes or issues, helping to identify patterns, relationships, and research gaps within specific areas.
- Chronological reviews arrange studies according to time sequence, showing the evolution and development of knowledge over different periods.
- Methodological review classifies studies based on the research methods and techniques used by researchers.

## **2.6 Questions and Exercises**

Q.1. Discuss the need and importance of literature review.

- Q.2. What are the different sources of literature review?
- Q.3. Explain the primary source of literature review with appropriate examples.
- Q.4. What do you mean by secondary source of literature review? Give examples.
- Q.5. Discuss the tertiary source of literature review with appropriate examples.

## 2.7 References and Suggested Readings

- Best, J. W., & Kahn, J. V. (2006). *Research in Education* (10th ed.). Pearson Education.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). SAGE Publications.
- Kothari, C. R. (2004). *Research methodology: Methods and techniques* (2nd ed.). New Age International Publishers.
- Koul, L. (2019). *Methodology of educational research* (5th ed.). Vikas Publishing House.
- Mishra, R.P. (2002). *Research Methodology*, Concept Publishing Company, New Delhi
- Narasimha Murthy K.L. *Research Methodology in Geography*, Concept Publishing Company, Delhi.
- Sharma, R. A. (2008). *Research in education*. Surya Publications.
- Sharma, R.A. *Educational Research*. Vinay rakheja.

### Websites:

- [https://www.lpude.in/SLMs/Master%20of%20Business%20Administration/Sem\\_2/D\\_EMGN832\\_RESEARCH\\_METHODODOLOGY.pdf](https://www.lpude.in/SLMs/Master%20of%20Business%20Administration/Sem_2/D_EMGN832_RESEARCH_METHODODOLOGY.pdf)
- [https://www.researchgate.net/publication/322754828\\_LITERATURE\\_REVIEW\\_SOURCES\\_AND\\_METHODODOLOGIES](https://www.researchgate.net/publication/322754828_LITERATURE_REVIEW_SOURCES_AND_METHODODOLOGIES)
- <https://sct.emu.edu.tr/en/Documents/Literature%20Review.pdf>
- <https://atlasti.com/guides/thematic-analysis/thematic-analysis-literature-review>

## UNIT- 3

### ORGANIZING THE RELATED LITERATURE

#### Unit Structure:

- 3.1 Introduction
- 3.2 Objectives
- 3.3 Principles and Procedure for the Review of Literature
- 3.4 Organizing the Related Literature
  - 3.4.1 Recording Reference Information
  - 3.4.2 Recording Content of References
  - 3.4.3 Preparation of Related Literature Report
- 3.5 Summing Up
- 3.6 Questions and Exercise
- 3.7 References and Suggested Readings

#### 3.1 Introduction

The organizing of related literature is a crucial part of the review process because it helps to present the collected studies clearly and methodically. After discovering and selecting relevant literature, the researcher must arrange the studies in a logical order so that the review is coherent and understandable. Proper structure allows the reader to follow the flow of ideas, concepts, and research findings relevant to the topic. A well-organized study of the literature aids in the grouping of related studies, comparing various points of view, and spotting patterns and gaps in previous research. It also guarantees that the literature review is more than just a list of papers, but rather an organized synthesis of prior information. As a result, gathering relevant material is critical to establishing a solid foundation for the current study.

#### 3.2 Objectives

After completion of this unit, the learner will be able to

- *know* the principles and procedures of review of related literature;
- *understand* the concept of organizing the review of related literature;
- *understand* the process of organizing the review of related literature.

### 3.3 Principles and Procedures for the Review of Literature

The following is the specific procedure through which review can be done appropriately-

- i. It is generally advisable to get a first and overall view by consulting a general source, such as a textbook, which is more likely to provide the meaning and nature of the concepts and variables or the theoretical framework of the field. The logical starting point is to get a clear picture of the problem to be solved. A textbook usually provides the theoretical aspects of the problem. It is essential to develop a deep understanding of the variables and the field studied.
- ii. After developing the insight about the general nature of his problem, the investigator should review the empirical research in the area. The best reference for this phase is the Handbook of Research. Encyclopaedia of Education Research, the Review of Education Research, and International Abstracts for more up-to-date findings. The researcher's major concern at this point should be to get a clear picture of the field as a whole; specific details are important at this stage. He should start from a topical outline and a set of classifications, so that whatever he reads can be made meaningful.
- iii. The research for library material must be systematic and deep. The investigator generally should start by collecting their references from the educational index. When many references are to be copied, they should be typed because precision is required here.
- iv. The researcher should take note systematically in the light of such criteria as uniformity, accuracy, and ease of assembly. The notes should be taken on the card. Each entry should be made separately; references should be recorded with complete bibliographic data. It should be recorded on the front side of the card, and the content should be taken below and on the reverse side of it. Each note should be recorded carefully and accurately.
- v. The investigator should take as complete notes as he might need. On the other hand, taking unnecessary notes is wasteful. The useful and necessary material should be recorded precisely. It would be better if similar sources were gathered. It is necessary that a general education of each source, rather than simply a summary of its content, be made. Such evaluation is necessary both in presenting the study in the review of literature and in using the study as background for the interpretation of the findings of the study.

- vi. A major pre-requisite for effective library work is the ability to read at high speed. This can only be developed through practice. He must learn to skim material to see what it has to contribute to the study; only after its reference has been established, should it be read in detail. Surveying the literature for the purpose of conducting research is not just ‘a pleasant excursion in the wonderful world of books’; it is a precise and exacting task of locating specific information for a specific purpose.
- vii. The actual note-taking process is always a difficult task for the researcher. The researcher has to spend long hours in the library taking notes. The researcher should make use of the facilities available in the library for this purpose.

#### **STOP TO CONSIDER**

The organizing of related literature is a crucial part of the review process because it helps to present the collected studies clearly and methodically.

The specific procedure through which the review can be done appropriately by-

- Start by consulting textbooks to understand basic concepts, variables, and theoretical background.
- Review empirical research (journals, handbooks, encyclopaedias) to get a complete view of the field.
- Conduct a systematic and thorough library search using indexes and references.
- Maintain accurate and organized notes with complete bibliographic details.
- Record only relevant and useful information; avoid unnecessary note-taking.
- Evaluate sources critically instead of only summarizing them.
- Develop the ability to read quickly and skim material to identify useful content.
- Take detailed notes only after confirming the relevance of the material.

### **3.4 Organizing the Related Literature**

After making a comprehensive survey of the related literature, the next step for the researcher is to organize the pertinent information systematically. It should be done in such a way as to justify carrying out the study by showing what is known and what remains to be investigated in the topic of concern.

According to Ary et al. (1972, p. 67), the hypotheses provide a framework for organizing the related literature. Like an explorer proposing an expedition, one maps out the known territory and points the way to the unknown territory he proposes to explore. If the study has several

aspects or is investigating more than a single hypothesis, this is done separately for each facet of the study.

One should avoid the temptation to present the literature as a series of abstracts. Rather, it should be presented in such a way as to lay a systematic foundation for the study.

### **3.4.1 Recording Reference Information**

The organization of the related literature involves recording the essential reference material and arranging it according to the proposed outline of the study.

Once pertinent information has been identified, the researcher should record certain essential information for locating the material on a 3 x 5-inch index card to serve as a bibliography card. To make writing of the final report simpler, the information recorded in the bibliography card should appear, in content and style, exactly as it will appear in the final report.

The basic information in the bibliography card should include the name of the author with last name first; title of the book or article; name of the publication (for articles); name of the publisher; date of publication; volume number, page numbers; and library call number (for books). If some of this information is not available, the specified space should be left blank so that the missing information can be included immediately upon locating the references.

### **3.4.2 Recording Content of References**

After recording the essential information on the bibliography cards, it is necessary example, the researcher may list together all cards about the material located in the periodical section. Similarly, all the material located in the reserve section may constitute another list, and so on. Then the researcher should make a systematic review of the material located in a specific section of the library, and after reviewing each reference on the list, they should proceed to another list.

All the information likely to be used in the final report should be recorded on a 4 x 6-inch card to serve as a content card. The information to be recorded on the content cards will depend on the source from which it is taken. If it is from a primary source, it may include brief bibliographic information comprising author's last name, brief title of the report, specific page numbers on which information is located sentence statement of the problem;

brief description of the study; statements of findings or conclusions, or both; a card code as to the aspect of the research to which the material most closely relates.

The information to be recorded from the secondary source is somewhat different from that of the primary source. Turney and Robb (1971, p. 55) have given the following suggestions for recording information from a secondary source:

1. Provide brief bibliographic information (as with a primary source).
2. Record on a single card only those statements that are related to the same topic (if all the information cannot be placed on one card, continue statements on another card and staple to the first card).
3. Paraphrase, in complete statements, the most relevant ideas. Record direct quotations only if they are stated concisely and effectively, and if paraphrasing might change the meaning.
4. Place a page number and a paragraph number after each separate statement, indicating its location in the reference, in case you need to review it again.
5. Code the cards (probably in the upper-right-hand corner) according to topic(s) to which it most closely relates.

### **3.4.3 Preparation of the Related Literature Report**

For the preparation of the report of the related literature, the researcher should arrange the bibliographic and content cards according to the proposed outline of the problem. This can be done with the help of a card code.

The report of the related literature should begin with an introductory paragraph describing the organization of the report. After the introduction, the researcher should present the studies most relevant to each aspect of the proposed problem outline. Studies with similar and contradictory results should be reported side by side without using excessive space.

#### **CHECK YOUR PROGRESS**

Q.1. Write the procedures of review of related literature.

Q.2. Discuss the process of organizing a review of related literature.

### 3.5 Summing Up

- After collecting relevant literature, it must be organized systematically to ensure clarity and logical flow.
- The organization of literature should highlight existing knowledge and identify research gaps, thereby justifying the need for the study.
- Literature should not be presented as isolated summaries but as a coherent and integrated framework supporting the research problem.
- Hypotheses or research objectives can be used as a basis for organizing literature, especially when the study has multiple aspects.
- Each aspect or variable of the study should be reviewed and organized separately for better understanding.
- Proper organization requires recording essential reference details for each source.
- Bibliographic information should include the author's name, title, publication details, date, volume, and page numbers.
- A well-organized literature review forms a strong foundation for the research study and facilitates effective report writing.
- After collecting literature, the researcher systematically records important information.
- Content cards are used to note key ideas, findings, and references for easy use.
- Information from primary sources includes original study details like problem, method, and findings.
- Information from secondary sources is summarized or paraphrased in simple statements.
- Each card is coded according to topic to help in organizing similar information together.
- Proper recording helps in easy retrieval and avoids loss of important data.
- For report writing, all information is arranged according to the research outline. Similar and different findings are presented together for better understanding.
- A well-organized literature review makes the research clear, systematic, and effective.

### 3.6 Questions and Exercise

- Q.1. Discuss the principles and procedures of review of related literature.
- Q.2. What is meant by the organization of related literature?
- Q.3. Explain the process of organizing a review of related literature in research.

### 3.7 References and Suggested Readings

- Best, J. W., & Kahn, J. V. (2006). *Research in Education* (10th ed.). Pearson Education.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). SAGE Publications.
- Kothari, C. R. (2004). *Research methodology: Methods and techniques* (2nd ed.). New Age International Publishers.
- Koul, L. (2019). *Methodology of educational research* (5th ed.). Vikas Publishing House.
- Sharma, R. A. (2008). *Research in education*. Surya Publications.
- Sharma, R.A. *Educational Research*. Vinay rakheja.

#### Websites:

- <https://library.sacredheart.edu/c.php?g=29803&p=185920>
- [https://libraryservices.acphs.edu/lit\\_review/organize\\_your\\_review](https://libraryservices.acphs.edu/lit_review/organize_your_review)
- <https://guides.library.stonybrook.edu/literature-review/organize>

---x---

## UNIT- 4

### ETHICAL ISSUES IN SOCIAL RESEARCH

#### Unit Structure:

- 4.1 Introduction
- 4.2 Objectives
- 4.3 Social Science Research
  - 4.3.1 Nature of Social Science Research
  - 4.3.2 Scope of Social Science Research
- 4.4 Research Ethics
  - 4.4.1 Objectives of Research Ethics
  - 4.4.2 Importance of Ethics in Social Research
- 4.5 Ethical Issues in Social Research
- 4.6 Summing Up
- 4.7 Questions and Exercises
- 4.8 References and Suggested Readings

#### 4.1 Introduction

Social research is a systematic, scientific method of investigating human behaviour, social interactions, and societal challenges in order to develop knowledge and better understand social phenomena. Because social research involves direct contact with human participants, their experiences, opinions, and conditions, it bears a significant duty to ensure that individuals' rights and dignity are safeguarded throughout the study process. Ethics in social research refers to the moral principles and norms that govern study methodology. These principles assist the researcher in distinguishing between proper and improper practices and ensuring that the study is conducted in a fair, honest, and responsible manner. Ethical considerations are not only concerned with the methods used in research but also with the treatment of participants, the handling of data, and the reporting of findings. Ethics is important in social research because it protects well-being and rights. It guarantees voluntary involvement, informed consent, confidentiality, and protection against all forms of damage. Ethical practices also encourage honesty, integrity, and objectivity in research, which improves the credibility and trustworthiness of the results. Furthermore, adhering to ethical

standards promotes trust between researchers and participants while also protecting the research community's reputation. Thus, ethics serves as the foundation of social research, guiding researchers to conduct their investigations in a way that is respectful, responsible, and scientifically sound.

## 4.2 Objectives

After the discussion of this unit, the learner will be able to-

- *understand* the concept and nature of social research;
- *know* the concept and importance of ethics in research;
- *recognize* ethical issues in research practice.

## 4.3 Social Science Research

Social science research is a systematic method of exploring, analyzing, and conceptualizing human life in order to extend, correct, or verify knowledge of human behavior and social life. Social research seeks to find explanations for unexplained phenomena, to clarify the doubtful, and correct the misconceived facts of social life. It involves the application of the scientific method for understanding and analyzing social life in order to correct and verify the existing knowledge as a system. The main idea behind social research is to discover new interrelations, new knowledge, and new facts, and also to verify old ones. Human behavior may be influenced by certain values and laws. The main purpose of social research is to discover those laws that can be proper guidelines for studying human contact and behavior.

According to **C. A. Moser**: "Social research is a systematized investigation to gain new knowledge about social phenomena and problems."

According to **P.V. Young**: "Social research is a scientific undertaking which by means of logical methods aims to discover new facts or old facts and to analyze their sequences, interrelationships, causal explanations and natural laws which govern them."

### 4.3.1 Nature of Social Science Research

Social science research helps researchers understand why, where, what and how social life is built and reconstructed by providing insight into social events. Since, sociological research offers insight into the presence or displacement of fixed truths, it helps to understand

society's complexity. Social science is primarily concerned with social trends and the need to learn new information about social life. It is a research project that employs logical and systematic methods to learn new things about social phenomena or to confirm what we already know.

It aids in the comprehension of current theories as well as the creation of new ones. In-depth expertise and meticulous research on a related subject are needed for social research. Researchers use social science research as a strategic tool to question current expertise based on existing findings that go beyond previous understanding of social reality.

#### 4.3.2 Scope of Social Science Research

The scope of social science study is practically limitless, so too are the research materials. For social scientists, every category of social phenomena, every stage of human existence, and every stage of past and present growth is material.

The scope of social research includes:

- i. Social science elucidates the organised community and its social system in new ways.
- ii. Social science also opens up new avenues for scientific explanation
- iii. Experiments that aim to test or question current hypotheses and update them in light of new data
- iv. Social science aids in the development of new theories
- v. Social research also contributes to the current foundation of fruitful theories, methods, and understanding of social life and problem-solving.

#### **STOP TO CONSIDER:**

- Social science research is a systematic method of exploring, analyzing, and conceptualizing human life in order to extend, correct, or verify knowledge of human behavior and social life.
- According to **C. A. Moser**: “Social research is a systematized investigation to gain new knowledge about social phenomena and problems.”

- Social science research helps researchers understand why, where, what and how social life is built and reconstructed by providing insight into social events.
- Social science is primarily concerned with social trends and the need to learn new information about social life.

#### **4.4 Research Ethics**

The world ethics is originated from the ancient Greek word “ethos,” which means the way of living. Actually, it is a branch of philosophy that is totally related to the conduct or the character of a definite individual. The practice of ethics or the sense of ethics is quite visible from the era of Socrates. Ethics is a set of concepts and principles that guide us in determining what behavior helps or harms sentient creatures (Richard William Paul and Linda Elder, 2006). In fact, ethics is the determinant of conscience about what to do, when to do, and how to do something.

According to the Encyclopaedia, “Research ethics are the application of moral rules and professional codes of conduct to the collection, analysis, reporting, and publication of information about research subjects, in particular active acceptance of subjects’ right to privacy, confidentiality, and informed consent.” Research ethics fundamentally describe the guidelines followed by a researcher while working on the research.

According to The Research Excellence Framework, 2014, research is "a process of investigation leading to new insights, effectively shared." Research is a multi-stage process. Ethics are central to the research process. Researchers need to take care of various ethical issues at different levels of this process. The reality is that there can be ethical concerns at every step of the research process (Bickman& Rog, 2009). According to Resnik (1998), research ethics are the common denominator for researchers’ relations with respondents and colleagues. Researchers must take sole responsibility for the ethical conduct of their own research. In simple terms, we can say that ethics are the researcher's responsibility. First and foremost, the responsibility of a researcher is to take care of the safety, dignity, rights, and well-being of the participants. Researchers must take care of various other issues at different stages of the research process.

#### 4.4.1 Objectives of Research Ethics

The objectives of the research ethics are:

- i. The first and broadest objective is to protect human participants.
- ii. The second objective is to ensure that research is conducted in a way that serves the interests of individuals, groups, and/or society.
- iii. Finally, the third objective is to examine specific research activities and projects for their ethical soundness, looking at issues such as the management of risk, protection of confidentiality, and the process of informed consent.

#### **CHECK YOUR PROGRESS**

Q.1. What is social science research?

Q.2. Write the definitions of social science research.

Q.3. Write the scope of social science research.

Q.4. Discuss the concept and objectives of research ethics.

#### 4.4.2 Importance of Ethics in Social Research

Ethical concerns have long been a focus of social science study. People are the primary source of information in most sociological studies. They may be survey respondents, subjects of observation, or experiment volunteers. Sociologists, as opposed to researchers in the fields of physics and chemistry, work with living, breathing people. Sociologists must therefore be sensitive to those they investigate. It consequently necessitates a high level of sensitivity and awareness to avoid any misuse or injury to people within the scope of the research project. Ethical considerations of sociologists lie not only in the methods they use and the funding they accept but in the way they interpret their results. Hence, ethics should be incorporated in all stages of research.

Integrating ethics throughout the research process, from problem selection to goal implementation, interpretation, and reporting of study findings, is vital to ensuring that the research process is governed by ethical principles other than informed consent. Researchers

should always be mindful of their responsibilities to the communities and societies in which they live and work, and aim to serve the public. Researchers should strive to maximise the advantages of their research while minimizing the potential risk or harm to participants and researchers. All potential hazards or harm should be mitigated by strong safeguards. Independence of research should be maintained, and any conflict of interest or partiality on behalf of the researchers, funding, or commissioning body should be made explicit before and/or during a specific research project.

The topic of ethics is both essential and challenging in the context of social research for two primary reasons: First, the research process involves a large number of stakeholders, and the researcher is responsible for all of them. This role entails conducting research and presenting results in an ethical manner. Let us investigate this matter thoroughly. The researcher is initially responsible for the individuals he or she is studying. In addition, he or she is responsible to the researcher's funding organization (if any), as well as colleagues and/or other researchers who will consult on the study effort. Second, the results of the study are likely to add to the body of existing knowledge. It could also be used by policymakers. Any research that does not adhere to ethics could be misleading. Ethics in research entails accountability towards those who have contributed to the research in any way, as well as the consequences of one's research.

#### **STOP TO CONSIDER:**

- According to the Encyclopaedia, "Research ethics are the application of moral rules and professional codes of conduct to the collection, analysis, reporting, and publication of information about research subjects, in particular active acceptance of subjects' right to privacy, confidentiality, and informed consent."
- Integrating ethics throughout the research process, from problem selection to goal implementation, interpretation, and reporting of study findings, is vital to ensuring that the research process is governed by ethical principles other than informed consent.

## **4.5 Ethical Issues in Social Research**

### **a. Honesty:**

Honesty is a fundamental ethical principle in social research. Researchers must strive for truthfulness in all scientific communications, including the reporting of data,

results, methods, and procedures. They should neither fabricate, falsify, nor misinterpret data in any form. Honesty also involves being transparent with participants, colleagues, funding agencies, and the public about the nature and outcomes of the study. It ensures credibility and trust in the research process.

**b. Objectivity**

Objectivity refers to maintaining neutrality and avoiding bias in all aspects of research. The researcher should strive to eliminate personal, cultural, or financial biases in research design, data collection, analysis, interpretation, and reporting. Objectivity also requires disclosure of any potential conflicts of interest. By ensuring objectivity, the researcher enhances the validity and reliability of the findings.

**c. Integrity**

Integrity involves maintaining consistency between one's words and actions, as well as adhering to moral and professional standards. A researcher must keep promises, honor agreements, and act with sincerity throughout the research process. It includes avoiding misleading practices, not raising false expectations among participants, and ensuring that all research activities are conducted in a responsible and trustworthy manner.

**d. Carefulness**

Carefulness refers to the researcher's responsibility to avoid errors, negligence, and oversight in all stages of the research process. The researcher should carefully design the study, collect and analyze data systematically, and critically examine both their own work and that of others. Maintaining accurate and detailed records of research activities- such as data collection procedures, research design, and communication with agencies- is an essential aspect of carefulness. This principle ensures precision and reliability in research.

**e. Openness**

Openness in research involves a willingness to share data, findings, ideas, tools, and resources with others. Researchers should be transparent in their work and remain receptive to constructive criticism, feedback, and new ideas. Openness promotes collaboration, verification of results, and the advancement of knowledge. It also

reflects the researcher's readiness to improve the quality of research through dialogue and academic exchange.

**f. Respect for intellectual property**

Respect for intellectual property requires researchers to acknowledge and honor the work of others. This includes respecting patents, copyrights, and other legal rights associated with intellectual contributions. Researchers must not use unpublished data, methods, or findings without proper permission. Proper citation and acknowledgement should always be given to the original authors. Avoiding plagiarism is a key component of this principle, ensuring academic honesty and integrity.

**g. Confidentiality**

Confidentiality refers to the obligation of the researcher to protect all sensitive and personal information obtained during the research process. This includes safeguarding confidential communications such as research papers, grant proposals, personnel records, and participants' personal data. In social research, especially when interviews or personal data are involved, the privacy and anonymity of individuals and groups must be strictly maintained. Researchers should respect participants' preferences regarding anonymity and ensure that all collected information is used only for research purposes and not disclosed without consent.

**h. Informed Consent**

Informed consent is a fundamental ethical requirement in social research. It means that participants voluntarily agree to take part in the study after being fully informed about its purpose, procedures, risks, and benefits. The researcher must provide clear and understandable information to participants without any form of coercion or undue influence. Participants should also be aware of their right to withdraw from the study at any stage. Thus, informed consent ensures respect for the autonomy and dignity of individuals involved in the research.

## **4.6 Summing Up**

- Social science research is a systematic study of human behaviour and social phenomena.

- Ethics in social research refers to the moral principles that guide responsible research practices.
- Ethical considerations are essential to protect the rights, dignity, and welfare of the participants.
- Ethics helps in ensuring honesty, credibility, and scientific validity in research.
- Honesty requires the researcher to present data, results, and methods truthfully without falsification, fabrication, or misrepresentation.
- Objectivity means avoiding personal bias and maintaining neutrality in all stages of research, including design, data collection, analysis, and interpretation.
- Integrity involves maintaining consistency between words and actions and adhering to moral and professional standards.
- Carefulness requires researchers to avoid errors and negligence by conducting research in a precise and systematic manner.
- Openness refers to the willingness of researchers to share data, findings, and ideas with others.
- Researchers must respect the work of others by properly acknowledging sources and giving due credit. They should not use others' ideas, data, or findings without permission.
- Confidentiality requires the researcher to protect participants' privacy and identity. Personal information and collected data during the study must not be disclosed without consent.
- Informed consent means that participants voluntarily agree to participate in the research after being fully informed about its purpose, procedures, risks, and benefits.

#### **4.7 Questions and Exercises**

- Q.1. Define social science research.
- Q.2. Explain the concept of social science research.
- Q.3. Discuss the nature and scope of social science research.

Q.4. Discuss the importance of ethics in social research with suitable examples.

Q.5. Describe the ethical issues of social research and their significance.

#### 4.8 References and Suggested Readings

- Arafat M. Y (2024) Research Ethics: Meaning and Principles. *International Journal of Recent Research Aspects*, Vol.11 pp. 8-11
- Best, J. W., & Kahn, J. V. (2006). *Research in Education* (10th ed.). Pearson Education.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). SAGE Publications.
- Kothari, C. R. (2004). *Research methodology: Methods and techniques* (2nd ed.). New Age International Publishers.
- Koul, L. (2019). *Methodology of educational research* (5th ed.). Vikas Publishing House.
- Sharma, R. A. (2008). *Research in education*. Surya Publications.
- Sharma, R.A. *Educational Research*. Vinay rakheja.

---x---

**BLOCK- 3**  
**RESEARCH DESIGN**

**Unit 1: Design of the Study- Population**

**Unit 2: Sampling- Meaning, Nature and Types of Sampling**

**Unit 3: Representative vs. Random Sampling, Techniques of Randomization in Sample Selections**

**Unit 4: Sample Size, Random Sampling Errors and its Importance for Drawing Inferences**

**Unit 5: Tools of Educational Research- Observation Schedule, Questionnaire, Interview Schedule, Inquiry Forms**

## UNIT-1

### DESIGN OF THE STUDY- POPULATION

#### Unit Structure:

- 1.1 Introduction
- 1.2 Objectives
- 1.3 Meaning of Population
  - 1.3.1 Types of Population
- 1.4 Importance of Population in Research
- 1.5 Population Characteristics
- 1.6 Population in Quantitative and Qualitative Research
- 1.7 Summing Up
- 1.8 References and Suggested Readings
- 1.9 Model Questions
- 1.10 Answer to Check Your Progress/Possible Answers to SAQ

#### 1.1. Introduction

Research methodology refers to the systematic framework used to plan conduct and analyze a research study. It outlines the procedures and techniques that guide a researcher in answering the research questions in a logical and scientific manner. A well defined research methodology ensures that the study is reliable valid and replicable. Research methodology typically includes the research design which explains the overall approach of the study such as quantitative, qualitative or use of both the methods. It also describes the **population** and **sample** indicating who or what will be studied and how participants or units will be selected. Data collection methods such as surveys interviews observations or experiments are specified along with the instruments used to gather data. In addition to this, the methodology explains the data analysis techniques applied to interpret the collected information. Ethical considerations including informed consent confidentiality and voluntary participation are also addressed.

In research methodology the study design establishes the overall structure through which a research problem is examined. A fundamental element of this design is the **population**. The

population refers to the group of individual objects events or units from which data are gathered and to which the results of the study are expected to apply. Clearly defining and justifying the population is very much essential for maintaining scientific rigor validity, reliability and ethical soundness of the study.

This unit of this block section will highlight a detailed discussion of population as a core component of research design. It will explain what is meant by population and outlines the different types of populations commonly used in research. The unit will also emphasize how proper population specification strengthens generalizability supports internal validity and enhances the practical feasibility of conducting the study. It will also describes the importance of the key population characteristics and population for quantitative as well as qualitative research.

## **1.2 Objectives**

After going through this unit, you will be able to-

- *discuss* the concept of population as a core components of research methodology;
- *identify* the different types of population;
- *explain* the importance of population in research;
- *list out* the key population characteristics and
- *explain* population for quantitative as well as qualitative research.

## **1.3 Meaning of Population**

Population refers to the entire aggregation of cases that meet a specified set of criteria. It includes all persons objects or elements that share characteristics of interest to the researcher. In research the population is commonly described as the target population also known as the universe. The target population consists of the complete group of people or objects to which the researcher intends to generalize the findings of the study. It includes only those individuals or items that meet the predefined criteria relevant to the research problem.

Population is not limited to human participants. It may also include non human elements such as hospital records laboratory reports blood samples, educational institutions, time units, and geographical areas, prices of wheat or salaries drawn by individual or other documented

materials. In practice researchers usually draw samples from an available group known as the accessible population or study population. The accessible population represents the portion of the target population that the researcher can realistically reach and from which data can be collected. It is essential for the researcher to clearly identify this accessible population because the conclusions of the study are based on data obtained from it. Statistical inferences and generalizations should therefore be made only to the group from which the sample was randomly selected.

Defining the population is a critical step in research design as it sets the boundaries and scope of the study's findings. A population must be clearly and precisely defined so that there is no uncertainty about whether a particular unit belongs to it. For instance in a study measuring achievement in mathematics the researcher must specify the population in terms of age group or grade level and may also define the type of school the geographical location and the academic year of the study. Meaningful inferences about a population cannot be made unless the nature of its units is clearly identified. If the population is not properly defined the researcher cannot determine which units should be included when selecting a sample.

#### **STOP TO CONSIDER**

Population and universe are closely related terms in research methodology and are often used interchangeably. However there is a subtle distinction between the two concepts based on their usage and scope. The universe refers to the entire set of all possible individuals objects or elements that possess the characteristics of interest in a study. It represents the broadest and most inclusive group to which a research problem is related. The universe defines the total domain of the study without any practical limitations. The population is a more specific and clearly defined subset of the universe that meets certain predetermined criteria set by the researcher. It represents the group from which data are actually collected and to which the findings of the study are intended to be generalized.

In most research studies the population is a large group of people objects or individuals that form the main focus of scientific investigation. Although research is intended to benefit this entire group it is often impractical to study every member because of limitations of time effort and cost. Therefore researchers use sampling techniques to select a smaller group that represents the population. In this context a research population can be described as a well

defined collection of individuals or objects that share common characteristics or attributes relevant to the purpose of the study.

### **Check Your Progress**

1. What is meant by population in research?
2. Does population include only human population?

### **1.3.1 Types of Population**

The population is essential to the planning and carrying out of any study in research technique. The term "population" describes the whole set of people, things, or units that have particular traits that are pertinent to the study question. Populations must be categorized into several types since they can vary greatly in size, nature and existence. Knowing the various population types enables the researcher to precisely define the scope of the study, use of suitable sample strategies and draw reliable conclusions. Following are the key types of population in research:

#### **1. Finite Population**

A finite population is a population in which the total number of elements is fixed and limited. Every unit in the population can be identified and counted if required. Because the size of the population is known researchers can design precise sampling strategies and in some cases may even study the entire population. Finite populations are common in educational institutional and organizational research. All 250 nurses working in a district hospital or all 400 students studying in the tenth class of a particular school represent finite populations.

#### **2. Infinite Population**

An infinite population is one in which the total number of elements cannot be counted or is theoretically unlimited. It is not possible to observe or list all units in such a population. Infinite populations are often conceptual rather than physically observable and are mainly used in statistical and probability studies. The outcomes of tossing a coin repeatedly an unlimited number of times or the values of atmospheric pressure at all possible points in the atmosphere are examples of infinite populations.

### **3. Existent Population**

An existent population consists of elements that exist in reality at the time of the study. These populations are tangible and directly observable. Researchers can clearly identify the units included in the population and collect data from them using appropriate methods. Most applied research studies focus on existent populations. Patients admitted to a hospital during a specific year or employees working in a company or households living in a defined geographic area are examples of existent populations.

### **4. Hypothetical Population**

A hypothetical population is an assumed or imaginary population that does not physically exist but is defined for theoretical or analytical purposes. It includes all possible values or outcomes that could occur under a given set of conditions. Hypothetical populations are commonly used in statistical inference and probability theory. The population of all possible scores that students could obtain on a mathematics test or the outcomes of heads and tails from an infinite number of coin tosses represent hypothetical populations.

These population types help researchers clearly define the scope of their study and ensure appropriate sampling data analysis and interpretation.

#### **Check Your Progress**

3. State the key types of population.

### **1.4 Importance of Population in Research**

The population is a central element of any research study and it serves as the foundation upon which all other components of the study design are built. A clearly defined population guides the researchers in making methodological decisions and ensures that the study remains focused relevant and ethically sound. The importance of population in research design can be highlighted through the following dimensions:

#### **i) Defining the Scope of the Study**

The population defines the boundaries of the research by specifying who or what is included in the investigation. By clearly identifying the population the researcher limits the study to a particular group of individuals objects or events. This clarity helps avoid ambiguity ensures

consistency in data collection and allows the research objectives to be addressed systematically.

#### **ii) Establishing Generalizability**

Generalizability refers to the extent to which research findings can be applied beyond the sample to a larger group. Findings can only be generalized to the population from which the sample is drawn. If the population is poorly defined or inappropriate the applicability of the results becomes limited and may lead to incorrect conclusions. A well specified population strengthens the external validity of the study.

#### **iii) Making Sampling Decisions**

The characteristics of the population directly influence sampling decisions. Factors such as population size variability and accessibility determine the choice of sampling technique and the required sample size. Proper understanding of the population allows the researcher to select a sample that accurately represents it and ensures that the results are reliable and meaningful.

#### **iv) Deciding Data Collection Methods**

The nature of the population affects the selection of data collection instruments and procedures. Different populations may require different methods such as questionnaires, interviews observations or document analysis.

#### **v) Enhancing Validity of the Study**

A well defined population enhances both internal and external validity. When the population is clearly specified the researcher can better control extraneous variables and ensure that the findings truly reflect the phenomena being studied. Poor population definition may introduce bias and weaken the validity of conclusions.

#### **vi) Supporting Reliability and Consistency**

Population characteristics influence the consistency of data collection and measurement. Clearly identifying the population ensures that data are collected under similar conditions across participants or units which supports reliability. Consistent population criteria allow the study to be replicated by other researchers.

### **vii) Addressing Ethical Issues**

Population characteristics play a crucial role in addressing ethical issues in research. Studies involving vulnerable populations such as children, patients or marginalized groups require additional ethical safeguards. These may include special consent procedures protection of privacy and approval from ethical review boards to ensure the rights and well being of participants are protected.

### **viii) Feasibility**

The size accessibility and geographic distribution of the population influence the practical feasibility of the study. Large or widely dispersed populations may require more time resources and careful logistical planning. Clearly understanding the population helps the researcher assess whether the study can be conducted within available time financial and organizational constraints.

Hence, the population is a fundamental component of the research process and it has a significant impact on the design, implementation and results of a study. A well-defined population gives the study direction, makes its scope apparent and facilitates the proper collection and analysis of sampling data. It determines the degree to which conclusions may be generalized and used in practice while also ensuring that discoveries are legitimate, trustworthy, and morally sound. Research findings may become deceptive or of limited relevance if the population is not precisely understood. For research to be useful, credible and influential, the population must be carefully identified and justified. Researchers must give careful attention to defining and justifying the population in the study design.

#### **Self-Assessment Question**

1. Why is population important in Research?

.....  
.....  
.....

### **1.5 Common Population Characteristics**

Population characteristics are the key attributes that describe the members of a population. These characteristics help the researcher understand the context of the study and ensure that

appropriate sampling and data collection methods are used. Clearly identifying population characteristics improves clarity precision and comparability of research findings.

### **1. Demographic Characteristics**

Demographic characteristics describe basic personal attributes of the population. These commonly include :

- Age
- Gender
- Marital status
- Education level
- Occupation
- Income level

Such characteristics help classify participants and analyze variations within the population.

### **2. Geographic Characteristics**

Geographic characteristics refer to the physical location of the population. These include:

- Country
- Region
- Urban or rural setting
- Institutional or community-based location

Geographic factors often influence access resources culture and exposure to interventions.

### **3. Socio-economic Characteristics**

Socio-economic characteristics relate to the social and economic position of individuals within the population. These include:

- Employment status
- Socio-economic class
- Access to resources

These factors may significantly affect behavior opportunities and outcomes under investigation.

#### **4. Clinical or Behavioral Characteristics**

Clinical or behavioral characteristics are especially important in health and social science research. These include:

- Health status
- Diagnosis
- Lifestyle behaviors
- Exposure to specific interventions

Such characteristics help ensure that the population is relevant to the research objectives.

#### **5. Inclusion and Exclusion Criteria**

Inclusion and exclusion criteria clearly define who is eligible or ineligible to participate in a study. These criteria help create a homogeneous population reduce confounding factors and protect participants.

##### **a) Inclusion Criteria:**

Inclusion criteria specify the essential characteristics participants must possess to be included in the study. These may include a specific age range a particular diagnosis minimum years of experience or enrollment in a defined institution. Inclusion criteria ensure that participants are appropriate for addressing the research question.

##### **b) Exclusion Criteria:**

Exclusion criteria identify characteristics that disqualify individuals from participation. These may include the presence of comorbid conditions inability to provide informed consent participation in similar studies or language barriers. Clearly stated exclusion criteria improve internal validity and reduce potential risks to participants.

#### **6. Population Size**

Population size refers to the total number of elements in the defined population. Understanding population size is critical for determining sample size selecting suitable statistical methods and assessing the feasibility of the study. Large populations often require probability sampling techniques to ensure representativeness. Smaller populations may allow for complete enumeration or purposive sampling. When population size is unknown researchers may rely on institutional records previous studies or preliminary surveys.

Population size also affects statistical power since very small populations may limit the ability to detect significant effects.

### **7. Population and Ethical Considerations**

Ethical considerations are closely related to population selection. Certain groups such as children elderly individuals prisoners refugees and severely ill patients are considered vulnerable and require additional safeguards. Ethical issues include obtaining informed consent ensuring confidentiality and anonymity minimizing risks and maintaining cultural sensitivity. Researchers must ensure that population selection is fair voluntary and free from exploitation while safeguarding the rights and well being of participants.

### **8. Limitations Related to Population**

Every research study has population related limitations. Common limitations include restricted access to the target population sampling bias non response or participant attrition and overrepresentation or underrepresentation of certain subgroups. Acknowledging these limitations increases the credibility of the study and helps readers interpret the findings appropriately.

#### **Self-Assessment Question**

2. How would you differentiate population of qualitative Research from quantitative research?

.....  
.....  
.....

### **1.6 Population in Quantitative and Qualitative Research**

The population is an essential component of any research design, and its significance and function change depending on the type of study. The term "population" in research methodology refers to the set of people, things or units under study. However, quantitative and qualitative research methodologies differ greatly in how a population is defined, chosen and employed. While qualitative research concentrates on depth, context and comprehension of lived experiences, quantitative research prioritizes measurement representativeness and generalization. It is crucial to comprehend how populations are conceptualized in both

quantitative and qualitative research in order to choose suitable techniques that guarantee rigor and provide significant research results.

### **Population in Quantitative Research:**

In quantitative research the population is defined in clear precise and measurable terms. The primary aim here is to obtain a sample that accurately represents the population so that statistical analysis and generalization of findings are possible. The population is usually large and clearly bounded by specific criteria such as age location occupation or condition.

Key considerations in defining the population for quantitative research include the degree of homogeneity or heterogeneity among population members. Homogeneous populations reduce variability and allow more precise estimates while heterogeneous populations require larger samples to capture differences accurately. Another important factor is the accuracy of the sampling frame which is the list or source from which the sample is drawn. An incomplete or outdated sampling frame can lead to bias and weaken the validity of results.

Quantitative studies also involve decisions regarding probability and non probability sampling techniques. Probability sampling methods are preferred when generalization is a goal because they give each population member a known chance of selection. Overall quantitative research emphasizes representativeness objectivity and replicability. Therefore population definition must be exact operational and based on clearly stated inclusion criteria.

### **Population in Qualitative Research:**

In qualitative research the concept of population is approached differently. The focus is not on statistical generalization but on gaining an in depth understanding of experiences meanings and social processes. As a result the population is usually smaller and more narrowly defined.

Qualitative populations are often selected purposively based on their relevance to the research question rather than representativeness. Participants may include individuals with direct lived experience of the phenomenon under study key informants who possess specialized knowledge or members of specific social or cultural groups. The emphasis is on selecting information rich cases that can provide deep insights.

Rather than aiming to represent a large population qualitative research seeks to capture variation perspectives and context. The adequacy of the population is judged by data saturation which occurs when no new themes or insights emerge. Thus in qualitative research the population is defined by relevance depth and meaning rather than size or statistical representativeness.

Hence, population in both these research illustrate that its definition varies according to research design. While quantitative research prioritizes precision and generalization qualitative research emphasizes relevance context and understanding.

## **1.7 Summing Up**

We can sum up the unit by stating that:

- Research methodology typically includes the research design which explains the overall approach of the study such as quantitative, qualitative or use of both the methods. It also describes the population and sample indicating who or what will be studied and how participants or units will be selected.
- Population refers to the entire aggregation of cases that meet a specified set of criteria. It includes all persons objects or elements that share characteristics of interest to the researcher. In research the population is commonly described as the target population also known as the universe.
- Population is not limited to human participants. It may also include non human elements such as hospital records laboratory reports blood samples, educational institutions, time units, geographical areas, prices of wheat or salaries drawn by individual or other documented materials.
- The key types of population include ; Finite Population, Infinite Population, Existent and Hypothetical Population.
- Population has a significant impact on the design, implementation and results of a study. A well-defined population gives the study direction, makes its scope apparent and facilitates the proper collection and analysis of sampling data.

- Population characteristics are the key attributes that describe the members of a population. It include the demographic, geographic, socio-economioic characteristics, sample size etc.
- Population is used in both quantitative and qualitative research. In quantitative research, population prioritizes precision and generalization and inqualitative research it emphasizes relevance context and understanding.

### 1.8 References and Suggested Readings

- Basavayya, D., & Venkataiah, N. (2016). *Essence of educational research methodology*. Neel Kamal Publication Pvt. Ltd.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- Daroga, S., & Chaudhary, F. S. (2002). *Theory & analysis of sample survey designs*. New Age International Publishers Ltd.
- Kothari, C. R., & Garg, G. (2019). *Research methodology: Methods and techniques* (4th ed.). New Age International Publishers.
- Koul, L. (2019). *Methodology of educational research* (5th ed.). Vikas Publishing House Pvt. Ltd.
- Savitha, G., Prasad, P., Vijyata, A., Sharma, A., & Kandikota, A. (2024). *A textbook on research methodology*. KD Publications.

### 1.9 Model Questions

1. Define the term population in research.
2. What is meant by infinite population?
3. List and briefly explain the main types of population used in research.
4. Explain why population is important in research.
5. Describe the key characteristics of a population and explain how they influence research design.

6. Compare and contrast the concept of population in quantitative and qualitative research.
7. How does population definition impact study design, sampling, and generalizability in research?

### **1.10 Answer to Check Your Progress/Possible Answers to SAQ**

**Answer to question 1:** Population refers to the entire aggregation of cases that meet a specified set of criteria. It includes all people's objects or elements that share characteristics of interest to the researcher. In research the population is commonly described as the target population also known as the universe. The target population consists of the complete group of people or objects to which the researcher intends to generalize the findings of the study

**Answer to question 2:** No. Population is not limited to human participants. It may also include non human elements such as hospital records laboratory reports blood samples, educational institutions, time units, geographical areas, prices of wheat or salaries drawn by individual or other documented materials

**Answer to SAQ 1:** Population has a significant impact on the design, implementation and results of a study. A well-defined population gives the study direction, makes its scope apparent and facilitates the proper collection and analysis of sampling data.

**Answer to SAQ 2:** Population is used in both quantitative and qualitative research. In quantitative research, population prioritizes precision and generalization while in qualitative research it emphasizes relevance context and understanding.

---X---

## UNIT- 2

### SAMPLING- MEANING, NATURE AND TYPES OF SAMPLING

#### **Unit Structure:**

2.1 Introduction

2.2 Objectives

2.3 Meaning of Sampling

2.3.1 Nature of Sampling

2.4 Types of Sampling

2.5 Summing Up

2.6 References and Suggested Readings

2.7 Model Questions

2.8 Answer to Check Your Progress/Possible Answers to SAQ

#### **2.1 Introduction**

In the first unit of this block, we had made a thorough discussion on population. After selection of the population, the next important step is selection of sampling. Sampling is a vital concept in research methodology and it serves as a foundation for effective data collection and analysis. In many research situations, studying an entire population is impractical due to constraints such as time, cost and accessibility. As a result, researchers select a subset of the population, known as a sample, to represent the larger group. The quality of a research study largely depends on how well this sample reflects the characteristics of the population. Understanding the concept and nature of sampling is very much essential, as different sampling methods can influence research outcomes in various ways. In research methodology, especially in educational research, selecting an appropriate sampling technique helps researchers to address research objectives effectively and ethically. This unit will explore the concept of sampling and discusses various sampling methods in detail to equip you with the knowledge required to apply them appropriately in your research studies in future.

## 2.2 Objectives

After going through this unit you will be able to:

- *discuss* the concept of sampling;
- *identify* the nature of sampling;
- *list out* the types of sampling; and
- *explain* the process of Sampling

## 2.3 Meaning of Sampling

Sampling is a fundamental component of research methodology and refers to the process of selecting a representative subset from a larger population for the purpose of investigation. Since it is often impractical, time-consuming and costly to study an entire population especially in educational and social science research, sampling provides a practical and scientific means of collecting data that can be used to draw valid conclusions about the whole population.

A carefully designed sampling strategy enhances the accuracy, reliability and validity of research findings. By selecting a sample that adequately represents the population, researchers can ensure fairness, minimize bias and produce meaningful and generalizable results. Sampling helps reduce expenditure of time, effort, money and manpower, while allowing greater scope of measurement and improved precision.

In the sampling process, the population is first divided into smaller parts known as sampling units. These units must collectively cover the entire population without overlapping, ensuring that each element belongs to one and only one unit. The list of all such units is called the sampling frame, and constructing an accurate frame is a crucial step in sampling. Depending on the nature of the study, a sampling unit may be an individual, a group, a family, an institution, or a defined area.

A sample is a part or subset of the total population. Although smaller in size, it is expected to reflect the essential characteristics of the population. The size of the sample is denoted by ‘**n**’, and it may consist of one or more units selected using different categories of sampling

techniques like-probability or non-probability sampling techniques, depending on the research objectives, population characteristics and available resources.

Sampling an integral part of the research design is formulated after identifying the research problem and determining the type of research design like-exploratory, descriptive, or causal. Once the measurement tools and data collection instruments are prepared, the researcher designs the sampling procedure. This involves addressing key questions such as whether a sample should be taken, which sampling method to use, what type of sample is appropriate and how large the sample should be.

Although the formal development of sampling theory is relatively recent, sampling has long been used in everyday life, often unconsciously. In research, however, sampling must be carried out systematically to ensure that conclusions drawn from the sample are valid for the population being studied. A clear understanding of the concept of sampling enables researchers to design effective studies and make sound, evidence-based generalizations.

#### STOP TO CONSIDER

Here are some important terms used in sampling:

- A *sample* is a set of elements taken from a larger population.
- ‘A *statistic* is a numerical characteristic of a sample; a *parameter* is a numerical characteristic of population.
- A *sampling frame* is a list of all the people that are in the population.

#### Definitions of Sampling:

**W. G. Cochran:** *“In every branch of science we lack the resources to study more than a fragment of the phenomena that might advance our knowledge.”*

In this definition a ‘fragment’ is the sample and ‘phenomena’ is the population. The sample observations are applied to the phenomena, i.e., generalization.

**David. S. Fox:** *“In the social sciences, it is not possible to collect data from every respondent relevant to our study but only from some fractional part of the respondents. The process of selecting the fractional part is called sampling.”*

**F.N. Kerlinger:** *“Sampling is taking any portion of a population or universe as representative of the population.”*

**Y.D. Keskar:** *“Sampling is the generalization in terms of the whole group through the facts assembled relate to only part of it.”*

**P. Y. Young:** *“A statistical sample is a miniature picture or cross -section of the entire group or aggregate from which the sample is taken.”*

**Good and Hatt:** *“A sample as the name implies, is a smaller representation of a larger whole.”*

**Good and Scates:** *“Sampling is the process of selecting a representative portion of the population for the purpose of generalizing the results of the study to the entire population.”*

So on the basis of these definitions, we can consider sampling as a systematic and scientific process in research methodology that involves selecting a representative subset of individuals, groups, units or elements from a defined population in order to collect data, analyze characteristics and draw valid conclusions about the entire population. It is employed when studying the whole population is impractical or impossible due to limitations of time, cost, effort and resources. An effective sampling process ensures fairness, minimizes bias, enhances accuracy, reliability, validity and allows the findings obtained from the sample to be generalized to the larger population with confidence.

**Check Your Progress:**

1. What is meant by Sampling?
2. State any one definitions of Sampling.

### **2.3.1 Nature of Sampling**

Sampling is a vital element of research methodology that explains how a small group can be used to understand a much larger population. The nature of sampling highlights its role in ensuring representativeness accuracy fairness and efficiency in research. A clear understanding of the nature of sampling is essential for you to enables to design studies that

produce valid reliable and meaningful results. The following represents the nature of Sampling:

### **1. Sampling is a Representative Process**

Sampling seeks to select a subset that reflects the essential characteristics of the entire population. A representative sample ensures that the findings obtained from the study can be applied to the population with greater confidence.

### **2. Sampling is Systematic and Scientific in Nature**

Sampling is based on scientific principles and planned procedures. It avoids arbitrary selection and follows established methods which increase the objectivity and trustworthiness of research findings.

### **3. Sampling is Economic in Nature**

One of the most important characteristics of sampling is its economy. It reduces the time money and manpower required to conduct research while still allowing the collection of sufficient and relevant data.

### **4. Sampling Enhances Accuracy and Precision**

Studying a smaller group allows the researcher to apply better control over data collection procedures. This often results in more accurate measurements and greater precision in findings.

### **5. Sampling is a Facilitator of Generalization of Study**

Sampling enables researchers to draw conclusions about the entire population based on observations made from the sample. Proper sampling ensures that results are generalizable beyond the selected group.

### **6. Sampling is an Integral Part of Research Design**

Sampling is closely linked with the overall research plan. The type of research design determines the choice of sampling method and sample size.

### **7. Sampling Involves Clearly Defined Population and Units**

Sampling requires a well defined population and identifiable sampling units. Each unit must belong to only one category to avoid confusion and duplication.

## 8. Sampling Ensures Feasibility of Research

Sampling makes research practically possible. Without sampling many educational and social science studies could not be conducted due to limited resources.

## 9. Sampling Requires Careful Planning

Effective sampling does not occur by chance. It requires thoughtful planning regarding sample selection method sample size and population characteristics.

## 10. Sampling Reflects Population Diversity

A good sampling process captures variations within the population. This ensures that different subgroups are included in the study.

These nature of sampling highlights the importance of sampling in making research practical, scientific and reliable by ensuring representation accuracy efficiency and generalizability of research findings.

### Self-Assessment Question

1. Explain briefly the key features of Sampling.

.....  
.....  
.....

## 2.4 Types of Sampling

Sampling methods describe the different ways in which a researcher selects a sample from a population. The choice of sampling method directly affects the quality accuracy and usefulness of research findings. Since populations in educational and social science research are often large and diverse researchers rely on various sampling techniques to ensure representation feasibility and reliability. Understanding the types of sampling helps researchers select appropriate methods based on research objectives population size and available resources. Sampling is classified into two main categories—

**1. Probability Sampling;**

**2. Non-probability Sampling**

## **1. Probability Sampling**

A probability sample is a sample in which every element of the population has a known and non zero chance of being selected. This means that the likelihood of inclusion of each unit is predetermined and not left to the judgment of the researcher. Because the chances of selection are known probability sampling is considered objective and scientific. In probability sampling the selection of units is carried out through random procedures such as lottery methods random number tables or computer generated random numbers. These procedures ensure that personal bias does not influence the selection process. As a result the sample obtained is more likely to be representative of the entire population.

Common methods of probability sampling include - simple random sampling where every unit has an equal chance of selection, systematic sampling where every nth unit is selected from a list and stratified sampling where the population is divided into subgroups and samples are selected from each group. Each of these methods follows the principle of randomness.

Probability sampling is widely used in quantitative research because it allows researchers to generalize findings from the sample to the entire population with confidence. Since sampling error can be estimated and bias is minimized the results obtained through probability sampling are considered more reliable valid and scientifically sound.

### **Characteristics of Probability Sampling:**

Following are the key characteristics of probability sampling:

1. Every unit of the population has a known and non zero chance of being selected
2. Selection of units is based on random procedures
3. It ensures representativeness of the sample
4. Sampling bias is minimized
5. Results can be generalized to the entire population
6. Sampling error can be estimated statistically
7. It increases reliability and validity of research findings
8. It is suitable for large populations

9. It provides a scientific and objective basis for selection
10. It requires a complete and accurate list of the population

## **2. Non-Probability Sampling**

A non probability sample is a type of sample in which the selection of units is not based on chance and the probability of each unit being included in the sample is unknown. In this method cases are chosen in such a way that they provide relevant information for the study and help the researcher understand population characteristics with a certain degree of practical usefulness. Such samples are often referred to as purposive samples because selection is guided by the purpose of the research.

Non probability sampling relies largely on the judgment experience and discretion of the researcher rather than on random procedures. The researcher selects units based on convenience availability or specific criteria considered relevant to the study. Since there is no statistical basis for estimating sampling error the representativeness of the sample depends mainly on the researcher's experience and understanding of the population.

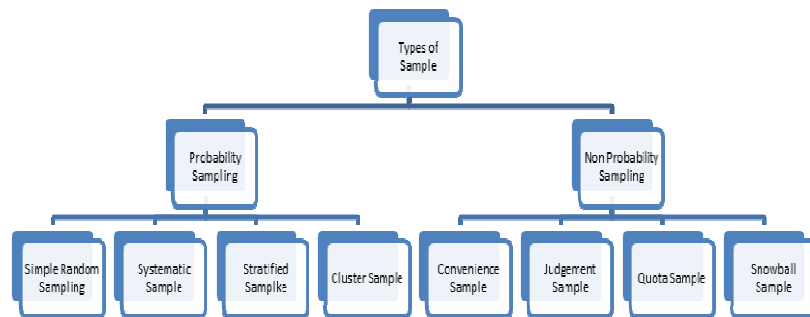
This type of sampling is widely used in qualitative and exploratory research and in areas such as market surveys where the aim is to study attitudes opinions behaviour and reactions of individuals within a short period of time. For example a researcher studying delinquency may deliberately select areas known from past experience to have higher rates of delinquent behavior. Similarly a researcher selecting a group of school students may use personal judgment to choose those who are believed to represent the population.

Common types of non probability sampling include- convenience sampling, purposive or judgment sampling, quota sampling and snowball sampling. These methods are especially useful when the sample size is small the population is difficult to define or access or when quick and economical data collection is required. Although non probability sampling does not allow precise generalization to the entire population it provides valuable insights and practical information in situations where probability sampling is not feasible.

### **Characteristics of Non Probability Sampling:**

Following are the characteristics of non-probability Sampling:

1. Selection of units is not based on chance
2. Probability of selection is unknown
3. Units are selected based on researcher's judgment or convenience
4. Sampling bias may be present in this technique.
5. Representativeness of the population is not guaranteed
6. Results cannot be generalized with statistical precision
7. It is suitable for small or hard to reach populations
8. It is quick and economical method of data collection
9. It is useful for qualitative and exploratory research
10. It relies on researcher's experience and knowledge to select appropriate units



**Self-Assessment Question**

2. Differentiate between probability and Non probability Sampling.

.....

.....

.....

**Types of probability sampling:**

**1. Simple Random Sampling**

In simple random sampling, each unit of the population is given an equal chance of being selected. The selection of units from the population is done in such a manner that every unit in the population has an equal chance of being chosen and the selection of any one unit is in no way tied to the selection of any other. The law of chance is allowed to operate freely in the selection. Carefully controlled conditions are created to ensure that each unit in the

population has an equal chance of being included in the sample. To prevent the researcher from being the results by exercising direct control over the selection of units, several devices are employed to draw samples from population. Some techniques are as under:

- Tossing a coin
- Throwing a dice
- Lottery method
- Blind folded method.
- By using random table or 'Tippet's table'.

Among these, the two popularly used methods in random sampling are -Lottery method and using a random number table. In lottery draw, for example, if we have to select a sample of 25 students from a total of 600 students in a college, then we make separate slips of paper for 600 students and put them in a box and thoroughly mix them. After that, a person is asked to pick up one slip. Here, the probability of each of the student being selected in the sample is  $1/600$ . This procedure is continued till the sample size is acquired.

#### **Merits of Simple Random Technique:**

- It requires a minimum knowledge of population.
- It is free from subjectivity and free from personal error.
- It provides appropriate data for one's purpose.
- The observations of the sample can be used for inferential purpose.

#### **Demerits of Simple Random Technique**

- It cannot ensure representativeness of a sample.
- It does not use the knowledge of the population.
- Its inferential accuracy depends upon the size of the sample

## **2. Systematic Random Sampling**

Systematic random sampling is a probability sampling method in which every  $n$ th unit from a population list is selected after choosing a random starting point. It is a structured and simple

method of selecting a sample while maintaining randomness. Systematic random sampling is widely used in educational and survey research because it is practical, efficient, and produces a sample that is fairly representative of the population if the list is not patterned.

### **Procedure of Systematic Random Sampling**

- a) Preparing a complete list of the population.
- b) Deciding the sample size (n).

Calculating the sampling interval (k) using the formula: Skip interval = (Number of elements in the population)/(the required sample size)

$$K = (N) / (n)$$

K = Skip interval

N = Universe size

n = Sample size

- c) Randomly selecting a starting point between 1 and k.
- d) Selecting every kth unit from the list until the required sample size is achieved.

For example if we have to select a sample of 100 persons from a universe of 1000 population, then the skip is 10. In this case one number between 1 and 10 has to be selected. Suppose 5 is selected, then the first sample would be 5th and the next one 15th, 25th, 35th, 45th, and so on. One of the advantages of this method is that it is more convenient than other methods and simple to design. Again, it is used with very large populations.

### **Merits of Systematic Random Sampling:**

- It is simple and easy to apply
- It ensures even distribution of the sample across the population
- It saves time and effort compared to simple random sampling
- It reduces the chances of clustering

### **Demerits of Systematic Random Sampling:**

- It may introduce bias if there is a pattern in the population list
- It is not completely random if population elements follow a periodic arrangement
- It requires an ordered and complete list of the population

### **3. Stratified Sampling**

It is an improvement over systematic method. In it the researcher divides his/her population in strata on the basis of some characteristics from each of these smaller homogenous groups (strata) the researcher draws at random a pre-determined number of units. He/she should choose that characteristics or criterion which seems to be more relevant in his research work.

#### **Types of Stratified Sampling:**

**Stratified Sampling is classified into three sub-categories:**

- a) Disproportionate Sampling:** It means that the size of the sample in each unit is not proportionate to the size of the unit but depends upon judgement and convenience. This method is more effective for comparing strata which have different error possibilities. It is less for determining population characteristics.
- b) Proportionate Sampling:** It refers to the selection of a sample from each sampling unit that is proportionate to the size of the unit. Its advantage include representativeness with respect to variables used as the basis of classifying categories and increased chances of the comparison between strata. Lack of information on proportion of the population in each category and faulty classification are the disadvantages of this method.
- c) Optimum Allocation Stratified Sampling:** It is representative as well as comprehensive. It refers to selecting unit from each stratum in proportion to the corresponding stratum of the population.

#### **Merits of Stratified Sampling:**

- It is a good representative of the population.
- It is an improvement over the earlier.

- It is an objective method of sampling.
- Observations can be used for inferential purpose.

#### **Demerits of Stratified Sampling:**

- It is difficult for the researcher to decide the relevant criterion for stratification.
- Only the criterion can be used of stratification.
- It is costly and time consuming.

#### **4. Cluster Sampling**

Cluster sampling is a probability sampling method in which the population is divided into naturally occurring groups called clusters. A few clusters are randomly selected for the study, and all units within the selected clusters are included in the sample. This method is particularly useful when the population is naturally divided into groups or when listing all individual population elements is difficult, costly, or impractical.

#### **Procedure:**

- a) Dividing the population into N clusters (e.g., schools, villages, city blocks).
- b) Randomly selecting n clusters to include in the sample.
- c) Identifying the number of observations within each cluster: (  $M = M_1 + M_2 + M_3 + \dots + M_N$  ).
- d) Assigning each element of the population to one and only one cluster.
- e) Collecting data from all units within the selected clusters or select a subsample from each cluster if necessary.

For example, a researcher studying academic performance in a district with 50 schools can randomly select 5 schools (clusters) and study all students in those schools instead of selecting students individually. This method reduces travel and administrative costs while still providing meaningful data.

#### **Merits of Cluster Sampling:**

- It is economical for large and geographically dispersed populations

- It reduces time and travel costs
- It is convenient when natural clusters exist

**Demerits of Cluster Sampling:**

- It may reduce precision if clusters are not homogeneous
- Here, sampling error can be higher than simple random sampling
- Selected clusters may not fully represent the entire population

**5. Multi-stage Sampling**

It is more comprehensive and representative of the population. In it the primary sample units are inclusive and secondary units are sub-groups within these ultimate units to be selected which belong to one and only one group. Whenever stratification is done by the researcher, stages of population are usually available within a group or population. The individuals are selected from different stages for constituting the multi-stage sampling.

**Procedure:**

- a) Dividing the population into primary clusters.
- b) Randomly selecting a few clusters from the first stage.
- c) Within each selected cluster, performing a second stage of sampling (e.g., simple random or systematic sampling) to select units.
- d) Repeating stages as needed depending on the complexity of the population.

For Example, a researcher studying students across a country may first randomly select states (primary clusters), then select schools within those states (secondary clusters), and finally select students from the chosen schools using simple random sampling.

**Merits of Multi-stage sampling:**

- It is a good representative of the population.
- It is an improvement over the earlier methods.
- It is an objective procedure of sampling.
- Its observations may be used for inferential purpose.

**Demerits of Multi-stage sampling:**

- It is difficult and complex.

- It involves errors while considering the primary and secondary stages.
- It is subjective in nature.

**Check Your Progress:**

Q.3. What are the types of Probability Sampling?

Q.4. State two merits and demerits of systematic Sampling.

**Types of Non-probability Sampling:**

Non-probability sampling is a method in which the selection of units is not based on chance and the probability of selecting any individual from the population is unknown. The selection depends on convenience judgment experience or specific research requirements. This method is widely used in qualitative exploratory and preliminary research where quick results and practical insights are required. The key types of non-probability sampling include the following:

**1. Convenience Sampling:**

Convenience sampling is so called because samples are selected on the basis of ease of access and availability. Investigators select respondents who are easiest to contact according to the instructions of the researcher. It is commonly used when time and resources are limited and when the purpose of research is exploratory. Example of this sample include-Selecting students who are present in a classroom on the day of data collection.

**Merits of Convenience Sampling:**

- It is simple and easy to conduct
- It saves time cost and effort
- It is suitable for exploratory and pilot studies

**Demerits of Convenience Sampling:**

- It is highly biased
- It does not ensure representativeness
- Findings cannot be generalized to the population

## **2. Judgment Sampling**

Judgment sampling involves the selection of samples based on the researcher's knowledge, experience, and judgment. The researcher selects those units which are believed to be representative of the population. This method is useful when population characteristics are well known to the investigator. For example, selecting schools known for academic excellence to study best teaching practices indicates judgment sampling.

### **Merits of Judgment Sampling:**

- Researcher's experience can be effectively used
- It is economical and less time consuming
- Useful for forecasting and specialized studies

### **Demerits of Judgment Sampling:**

- It is highly subjective
- It is not free from errors
- Generalization is not possible
- Inferential statistics cannot be used

## **3. Purposive Sampling**

Purposive sampling is a deliberate selection of units because they possess specific characteristics relevant to the study. The sample is chosen based on predefined criteria that are important. Selecting students with learning disabilities for a study on remedial teaching methods is an example of purposive sampling.

### **Merits of Purposive Sampling:**

- It uses the best available knowledge of subjects
- It provides better control over significant variables
- It ensures homogeneity of the sample
- Matching of groups becomes easier

### **Demerits of Purposive Sampling:**

- Reliability of the selection criteria may be questionable

- It requires thorough knowledge of the population
- Errors may occur in classifying subjects
- Results cannot be generalized in this sampling.

#### **4. Quota Sampling**

Quota sampling is similar to stratified sampling but selection within each category is not random. The population is divided into categories and a fixed quota is assigned to each category. The investigator is free to select samples within each quota. Selecting a fixed number of male and female respondents for a social survey is an example of quota sampling.

##### **Merits of Quota Sampling:**

- It is easy to administer
- It is less costly and time saving
- It provides moderate representation of heterogeneous populations
- It is commonly used in social and municipal surveys

##### **Demerits of Quota Sampling:**

- It is not a truly representative sample
- It is influenced by personal bias
- Regional geographical and social factors may affect results
- Sampling errors may occur in this sampling

#### **5. Snowball Sampling**

Snowball sampling is methods in which existing participants help identify additional participants. The sample grows like a snowball through referrals and networks. It is also known as chain networking or referral sampling. Studying delinquent behavior by asking one respondent to refer others with similar experiences is example of snowball sampling. The term; snow ball sampling' has been used to describe a sampling procedure in which the sample goes on becoming bigger and bigger as the observation or study proceeds. The term snowball stems from the analogy of a snowball sample which would allow computation of estimates of sampling error and use of statistical test of significance.

**Merits of Snowball Sampling:**

- It is useful for hidden or hard to reach populations
- It is less costly and time efficient
- It is effective for studies involving social networks

**Demerits Snowball Sampling:**

- It is highly biased due to referral process
- Sample may lack diversity
- Statistical generalization is not possible here in this sampling

As such, we can state that the different types of sampling provide researchers with flexible and practical ways to select study participants based on the nature of the research population objectives and available resources. Probability sampling ensures scientific accuracy representativeness and generalizability while non probability sampling offers convenience speed and depth of understanding in exploratory and qualitative studies. A clear understanding of the strengths and limitations of each type of sampling will enable you as researchers in future to choose the most appropriate method and enhance the credibility and usefulness of your research findings.

**2.5 Summing Up**

The unit can be sum up stating that:

- Sampling is a fundamental component of research methodology and refers to the process of selecting a representative subset from a larger population for the purpose of investigation
- In the sampling process, the population is first divided into smaller parts known as sampling units. These units must collectively cover the entire population without overlapping, ensuring that each element belongs to one and only one unit.
- There are many definition of sampling. Among them W. G. Cochran defined sampling as-“In every branch of science we lack the resources to study more than a fragment of the phenomena that might advance our knowledge.”

- Sampling is a vital element of research methodology that explains how a small group can be used to understand a much larger population. The nature of sampling highlights its role in ensuring representativeness accuracy fairness and efficiency in research. Some of its key features include-its systematic process, economic nature, sampling as facilitator of generalization etc.
- Sampling methods are broadly classified into two main types namely probability sampling and non probability sampling. Probability sampling includes simple random sampling stratified sampling systematic sampling cluster sampling and multi stage sampling in which each unit has a known chance of selection. Non probability sampling includes convenience sampling judgment or purposive sampling quota sampling snowball sampling selection is based on convenience or researcher judgment rather than chance.

## 2.6 References and Suggested Readings

1. Basavayya, D., & Venkataiah, N. (2016). *Essence of educational research methodology*. Neel Kamal Publication Pvt. Ltd.
2. Cochran, W. G. (1977). *Sampling techniques* (3rd ed.). John Wiley & Sons.
3. Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
4. Daroga, S., & Chaudhary, F. S. (2002). *Theory and analysis of sample survey designs*. New Age International Publishers Ltd.
5. Goldberg, H. I. (1991). *Survey sampling: An epidemiological approach to reproductive health*. World Health Organization.
6. Henderson, R. H., & Sundaresan, T. (1982). Cluster sampling to assess immunization coverage: A review of experience with a simplified sampling method. *Bulletin of the World Health Organization*, 60(2), 253–260.
7. Kothari, C. R., & Garg, G. (2019). *Research methodology: Methods and techniques* (4th ed.). New Age International Publishers.
8. Koul, L. (2019). *Methodology of educational research* (5th ed.). Vikas Publishing House Pvt. Ltd.

9. Pandurang, V. S. (1984). *Sampling theory of surveys with applications*. Iowa State Press.
10. Savitha, G., Prasad, P., Vijyata, A., Sharma, A., & Kandikota, A. (2024). *A textbook on research methodology*. KD Publications.

## 2.7 Model Questions

1. What is sampling? Define the term.
2. Mention any two key characteristics of sampling.
3. Explain the meaning of the nature of sampling.
4. Name the major types of non probability sampling.
5. Describe the nature of sampling with appropriate examples.
6. Distinguish between probability sampling and non probability sampling.
7. Explain the different types of sampling with suitable examples.
8. Discuss the importance of sampling in educational research.
9. Critically evaluate the suitability of different sampling methods in educational research. Justify your answer with examples.

## 2.8 Answer to check your progress/Possible Answers to SAQ

**Answer to question 1:** Sampling is a vital concept in research methodology and it serves as a foundation for effective data collection and analysis. In many research situations, studying an entire population is impractical due to constraints such as time, cost and accessibility. As a result, researchers select a subset of the population, known as a sample, to represent the larger group.

**Answer to question 2:** According to Y.D. Keskar: "Sampling is the generalization in terms of the whole group through the facts assembled relate to only part of it."

**Answer to question 3:** Types of Probability Sampling:

### 1. Simple Random Sampling

Each unit of the population has an equal chance of being selected through random methods.

## **2. Stratified Sampling**

The population is divided into subgroups and samples are drawn from each subgroup.

## **3. Systematic Sampling**

Every nth unit is selected from a population list after a random start.

## **4. Cluster Sampling**

The population is divided into clusters and some clusters are randomly selected for study.

## **5. Multi Stage Sampling**

Sampling is carried out in more than one stage using a combination of sampling methods.

### **Answer to question 4:**

Merits of Systematic Random Sampling:

- It is simple and easy to apply
- It ensures even distribution of the sample across the population

Demerits of Systematic Random Sampling:

- It may introduce bias if there is a pattern in the population list
- It is not completely random if population elements follow a periodic arrangement

### **Answer to SAQ 1:**

Few key nature of sampling includes:

#### **1. Sampling Enhances Accuracy and Precision**

Studying a smaller group allows the researcher to apply better control over data collection procedures. This often results in more accurate measurements and greater precision in findings.

#### **2. Sampling is a Facilitator of Generalization of study**

Sampling enables researchers to draw conclusions about the entire population based on observations made from the sample. Proper sampling ensures that results are generalizable beyond the selected group.

### 3. Sampling is an Integral Part of Research Design

Sampling is closely linked with the overall research plan. The type of research design determines the choice of sampling method and sample size.

**Answer to SAQ 2:**

#### **Difference between Probability Sampling and Non Probability Sampling:**

Probability Sampling is a scientific method of sampling in which every unit of the population has a known and non zero chance of being selected. Selection is carried out through random procedures which reduce personal bias. This type of sampling ensures representativeness of the sample and allows the researcher to generalize findings to the entire population. *On the other hand*, non Probability Sampling is a method in which the selection of units is not based on chance and the probability of selection is unknown. Sampling error cannot be measured and non parametric or descriptive statistics are usually used.

---x---

## UNIT- 3

### REPRESENTATIVE VS RANDOM SAMPLING, TECHNIQUES OF RANDOMIZATION IN SAMPLE SELECTIONS

#### Unit Structure:

- 3.1 Introduction
- 3.2 Objectives
- 3.3 Meaning of Representative Sampling
  - 3.3.1 Nature of Representative Sampling
  - 3.3.2 Components of Representative Sampling
- 3.4 Representative Vs Random Sampling
- 3.5 Techniques of Randomization in Sample Selection
- 3.6 Summing Up
- 3.7 References and Suggested Readings
- 3.8 Model Questions
- 3.9 Answer to Check Your Progress/Possible Answers to SAQ

#### 3.1 Introduction

Dear learners, in the earlier units of this block, you have been introduced with the concepts of Population and Sampling. You must have acquired clear concepts of both these components of research methodology. As we have come to know that Sampling is a fundamental process in research methodology, as it allows researchers to draw conclusions about a population based on a smaller, manageable subset. The accuracy and validity of research findings largely depend on how well the selected sample represents the target population. In the preceding unit, we have discussed about the different types of sampling techniques. In the study of sampling, we have come across random sampling which is widely used in research, but you must remember that besides the random sampling, there is another important concept of sampling i.e., representative sampling in research. Both are equally important types of sampling in research. A representative sample reflects the key characteristics of the population, ensuring that different groups within the

population are proportionately included. Its primary goal is to minimize bias so that findings can be generalized to the entire population. On the other hand, random sampling is a method in which every member of the population has an equal and independent chance of being selected. Random sampling is widely used because it reduces selection bias and supports the application of statistical inference. Here in this unit, we will deal with representative sampling as opposite to random sampling. Moreover, to achieve randomness in sample selection, researchers employ various randomization techniques. The unit will also focus on those techniques.

### 3.2 Objectives

After going through this unit, you will be able to—

- *discuss* about representative sampling;
- *explain* the nature of representative sampling;
- *differentiate* representative sampling from random sampling;
- *list out and discuss* the different techniques of randomization.

### 3.3 Meaning of Representative Sampling

Representative sampling refers to a sampling approach in which the selected sample accurately reflects the characteristics structure and diversity of the entire population under study. The main purpose of representative sampling is to ensure that the findings obtained from the sample can be generalized to the population with a high degree of confidence. In this type of sampling the proportions of important characteristics in the population such as age gender education socioeconomic status and geographic location are adequately included in the sample.

A representative sample is one that ***mirrors the population*** in terms of key variables that are relevant to the research objectives. This means that no significant group within the population is overrepresented or underrepresented. When a sample is truly representative the results derived from it provide a realistic picture of the population and reduce the risk of systematic bias. Representation is therefore closely linked to the validity and credibility of research findings.

Representative sampling does not necessarily mean that every individual has an equal chance of selection but it ensures that all important subgroups are fairly included. This can be achieved through careful planning and the use of appropriate sampling techniques such as stratified sampling where the population is divided into meaningful strata or class and samples are drawn from each group in proportion to their size. The focus of this sampling remains on capturing population diversity rather than relying solely on chance.

In research methodology representative sampling is especially important especially in social science, health, education and market research where population characteristics significantly influence outcomes. A well designed representative sample strengthens external validity and allows researchers to draw accurate meaningful and applicable conclusions. Without representativeness even a large sample may lead to misleading results and poor generalization.

To cite an *example* of representative sample, we can state the example of a researcher who wants to study the job satisfaction of teachers in a district that has a total of 1,000 teachers. The population consists of different groups based on school level and gender. There are 400 elementary school teachers, 350 secondary school teachers and 250 higher secondary school teachers. Among them 600 are female teachers and 400 are male teachers. To obtain a *representative sample* the researcher needs to select a sample of 100 teachers in such a way that the proportions of school level and gender in the sample match those of the population. Therefore the sample includes 40 elementary school teachers 35 secondary school teachers and 25 higher secondary school teachers. Similarly 60 female teachers and 40 male teachers are included in the sample. This sample will be considered as representative because it reflects the actual composition of the population. All major sub-groups are fairly included and no group is overrepresented or underrepresented. As a result the findings on job satisfaction can be reasonably generalized to all teachers in the district.

### **3.3.1 Nature of Representative Sampling**

The nature of representative sampling is defined by several key features that ensure reliability, validity and generalizability of research findings. It includes the following:

### **1. It Reflects Population Characteristics**

The sample mirrors the essential characteristics of the population, such as age, gender, income, education and location, in the correct proportions.

### **2. It minimizes Sampling Bias**

It reduces systematic bias by ensuring no group is overrepresented or underrepresented.

### **3. It focuses on Key Variables**

Here, emphasis is placed on population characteristics relevant to the research objectives to ensure meaningful results.

### **4. It supports Generalization of Findings**

As the sample closely resembles the population, research results can be generalized to the entire population with confidence.

### **5. It makes use of Structured Sampling Techniques**

Techniques like stratified sampling or quota sampling are often used to ensure proportional representation of subgroups.

### **6. It enhances Research Validity**

Accurate representation of population diversity improves external validity and strengthens credibility.

### **7. It ensures Inclusiveness of Subgroups**

All significant subgroups of the population are fairly included, capturing diversity within the population in this sampling.

### **8. It reflects Population Distribution**

Proportions within the sample match the population distribution for critical variables, maintaining accuracy.

### **9. It reduces Error in Estimation**

By representing the population accurately, representative sampling minimizes estimation errors in research outcomes.

## **10. It provides Reliable Basis for Statistical Analysis**

Representative samples allow for valid application of statistical methods and hypothesis testing.

## **11. It is Dynamic and Flexible**

Representative sampling is dynamic in nature. It can be adapted to various population types, sizes and research objectives, ensuring relevance across different studies.

### **Check Your Progress:**

1. What is meant by representative sampling?
2. State few nature of representative sampling.

### **3.3.2 Components of Representative Sampling**

Representative sampling involves careful planning and execution to ensure that the selected sample accurately mirrors the population. The components of representative sampling provide the framework for designing a sample that is unbiased, valid, and generalizable. The key components include:

#### **1. Target Population**

The target population is one of the key components of representative sampling. It means the complete set of individuals, objects or events that the researcher intends to study. Clearly defining the target population is critical because it sets the boundaries for who or what is eligible to be included in the study.

#### **2. Sampling Frame**

The sampling frame comprises another key component of representative sampling. It is a complete and up-to-date list or database of all the elements within the target population. It serves as the source from which the sample is drawn. A well-prepared sampling frame ensures that every element in the population has a chance of selection and prevents coverage errors that can lead to bias.

### **3. Sample Size**

Sample size refers to the number of elements selected from the population for the study. Choosing an appropriate sample size is crucial to ensure that it is large enough to capture the diversity of the population while remaining manageable for analysis. A sample that is too small may lead to inaccurate or unreliable results, again an excessively large sample can be costly and unnecessary.

### **4. Stratification Variables**

Stratification variables are the key attributes of the population used to divide it into meaningful subgroups which is known as strata. Common stratification variables include age, gender, income, education, occupation or geographic location. By stratifying the population, researchers can ensure that each subgroup is proportionately represented in the sample.

### **5. Sampling Technique**

The sampling technique is the method that are used to select elements from the population. In representative sampling, techniques such as stratified sampling, quota sampling, or systematic sampling are commonly used to maintain proportional representation. The choice of technique depends on the population structure and research objectives.

### **6. Proportional Allocation**

Proportional allocation is again important in representative sampling. It ensures that each subgroup in the sample corresponds to its actual proportion in the population. For example, if 40 percent of the population is female, then 40 percent of the sample should be female. This prevents overrepresentation or underrepresentation and preserves the accuracy of the study.

### **7. Randomization**

Randomization involves the selection of sample elements by chance rather than by judgment. Even when using stratification, randomly selecting participants within each subgroup reduces selection bias, enhances objectivity and increases the credibility of results.

## 8. Inclusion and Exclusion Criteria

These are the specific rules that define which population elements are eligible or ineligible for the sample. Clearly defining these criteria ensures that the sample is consistent, relevant and aligned with the research objectives.

## 9. Representativeness Check

Representativeness check ensures that the sample accurately reflects the population's key characteristics. This step validates that the sample design has successfully captured the diversity and proportions of the population.

<b>Self-Assessment Question</b>
1. Explain the key components of representative sampling. ..... ..... .....

### 3.4 Representative Vs Random Sampling

Sampling is an essential step in research methodology because it allows researchers to study a manageable subset of a population while making valid inferences about the whole population. Two commonly used sampling approaches are representative sampling and random sampling. Although they share some similarities, they differ in purpose, design, and application. Let's explore the differences between representative sampling and random sampling in the following areas:

<b>Areas of difference</b>	<b>Representative Sampling</b>	<b>Random Sampling</b>
Meaning	Representative sampling ensures that the sample reflects the characteristics of the population. It focuses on proportionately including important	Random sampling is a method where every individual in the population has an equal chance of being selected. It focuses on

	subgroups so that findings can be generalized accurately.	fairness and objectivity.
Purpose	It ensures that sample mirrors population characteristics. For example, a survey of voters includes 60% urban and 40% rural respondents to match city demographics	Random sampling ensures that every individual has an equal chance of selection. For example, 100 students are selected randomly from 1,000 students using a lottery system
Bias	It reduces bias by representing all major subgroups. It ensures that male and female respondents are included according to population ratio in a health survey	Random sampling reduces selection bias through chance. Picking 50 students randomly without considering grade level
Techniques Used	Techniques used here are-Stratified sampling, quota sampling. For example, dividing a city population into age groups and selecting proportionate samples from each group.	Techniques used in random sampling include-Simple random sampling, systematic sampling. Selecting every 10th customer from a list for a survey is the example of techniques of random sampling.
Generalization	In terms of generalization, high accuracy due to representation of subgroups. For example, survey results accurately reflect the preferences of all ethnic groups in a city	In random sampling, generalization depends on randomness and sample size. Randomly selected students may not reflect distribution of classes or sections
Population Knowledge Required	Representative sampling requires prior knowledge of population characteristics. Knowing the percentage of urban/rural population before sampling is required.	Random sampling does not require detailed population information.
Complexity of Design	Representative Sampling often requires a careful and structured design to ensure all key subgroups are included. For example, stratifying a population	Simpler designs are only required in random sampling. It often just requires a list of the population. For example, using a random number generator to select

	by age, gender and income before sampling is required here.	participants from a school roster.
Risk of Sampling Error	There is chance of Lower sampling error because subgroups are proportionally included.	In random sampling, there is chance of higher chance of sampling error in small samples if certain subgroups are missed.
Time and Resource Requirements	It is more time-consuming and resource-intensive due to planning and stratification.	It is Less time-consuming as simple random selection is quick.
Suitability	Representative Sampling is more suitable when population size is small and diversity needs accurate reflection.	Random Sampling works well even with large populations, but may miss subgroups in small populations.
Statistical Analysis	In representative sampling, it is easier to analyze subgroups separately since all are proportionally included.	Subgroup analysis may be limited if the random sample did not include enough members of certain groups.
Flexibility in Adjustments	Representative Sampling is less flexible once the stratification and proportions are set. Adjustments require redesigning the sample.	Random Sampling is flexible. Here, additional participants can be randomly added easily without affecting selection rules.
Applicability in Experimental Research	Representative Sampling is more common in survey-based or descriptive research where population characteristics matter	Random Sampling is often used in experimental research where random assignment ensures control over confounding variables.

### 3.5 Techniques of randomization in Sample Selection

Randomisation is a fundamental concept in research methodology that refers to the process of assigning or selecting participants purely by chance rather than by choice or judgment. The main objective of randomisation is to eliminate bias and ensure fairness in the selection or allocation process. By giving every individual or unit an equal and independent chance of being selected or assigned randomisation enhances the objectivity and scientific rigor of research.

In research randomisation is commonly used in sampling. In sampling it ensures that each member of the population has an equal opportunity to be included in the sample. Randomisation plays a crucial role in improving the internal validity of a study. Various methods are used to

achieve randomisation including the lottery method random, number tables, computer generated random numbers and systematic procedures with random starts. Overall the concept of randomisation strengthens the credibility reliability and generalizability of research findings by ensuring unbiased and impartial selection and assignment.

### **Techniques of randomization in sample Selection:**

Randomization in sample selection is an essential principle in research methodology that ensures fairness objectivity and freedom from bias in selecting study participants. It is based on the idea that every unit of the population should have an equal and independent chance of being included in the sample. The use of randomization techniques helps researchers obtain unbiased samples improves the reliability of results and supports valid statistical inference. Various techniques of randomization are used depending on the nature size and structure of the population. Some of the important techniques include the following:

#### **1. Simple Random Sampling (Lottery Method)**

In this technique each member of the population has an equal chance of selection. The procedure involves preparing a complete list of all population elements and assigning each element a unique number. These numbers are then written on slips of paper mixed thoroughly and drawn blindly until the required sample size is obtained. The individuals whose numbers are selected form the sample. This method is simple and effective for small populations where a complete list is available.

**For example:** *A researcher wants to select a sample of 10 students from a class of 50 students to study learning habits. First all 50 students are listed and numbered from 1 to 50. Each number is written on identical slips of paper and placed in a box. The slips are mixed well and 10 slips are drawn randomly without looking. The students whose roll numbers match the selected slips are included in the sample. Since every student had an equal chance of being selected the sample obtained through this method is free from selection bias and truly random.*

## **2. Random Number Table Method**

In this technique researcher uses a table of randomly generated numbers to select sample elements. First the population units are numbered serially. A starting point in the random number table is chosen arbitrarily and numbers are read in a fixed direction such as vertically or horizontally. The numbers that correspond to the assigned population numbers are selected until the desired sample size is reached. This method avoids human bias and is suitable for both small and large populations.

**For example:** *A researcher wants to select a sample of 20 employees from an organization that has 200 employees to study job satisfaction. First all 200 employees are listed and assigned serial numbers from 001 to 200. Next the researcher selects a random number table and chooses an arbitrary starting point. The numbers are then read in a fixed direction such as horizontally. Each three digit number that falls between 001 and 200 is selected while numbers outside this range or repeated numbers are ignored. This process continues until 20 valid random numbers are obtained. The employees whose serial numbers match the selected random numbers form the sample. Since the selection is based entirely on random numbers and not personal choice the sample obtained is unbiased and representative of the population.*

## **3. Computer Generated Random Numbers**

In this method random numbers are generated using computer software or statistical programs. Each population element is assigned a unique number and the computer randomly selects the required number of units. The procedure ensures high accuracy speed and objectivity. This technique is widely used in modern research due to its efficiency and suitability for large datasets.

**Example:** *A researcher wants to select a sample of 80 teachers from a university that has 800 teachers to study job satisfaction. First a complete list of all 800 teachers is prepared and each teacher is assigned a unique number from 1 to 800. The researcher then uses a computer program such as Excel to generate 80 random numbers within the range of 1 to 800. The teachers whose assigned numbers match the computer generated random numbers are selected for the study. Since the selection is carried out entirely by the computer every teacher has an*

*equal chance of being chosen. This method eliminates human bias and is especially suitable for large populations where manual randomization is impractical.*

#### **4. Systematic Sampling with Random Start**

Systematic sampling involves selecting elements at regular intervals from an ordered population list after a random start. The procedure begins by determining the sampling interval by dividing the population size by the desired sample size. A random starting point between one and the sampling interval is then selected. From this point every  $k$ th element is chosen until the sample is complete. The random start ensures randomness while the systematic process simplifies selection.

**Example:** *A researcher wants to select a sample of 50 employees from a company that has 500 employees to study work environment satisfaction. First a complete list of all 500 employees is prepared in an ordered manner. The sampling interval is calculated by dividing the population size by the required sample size. In this case the sampling interval is  $500 \div 50 = 10$ . Next a random starting number between 1 and 10 is selected using a lottery method or random number table. Assume the random start chosen is 7. Starting from the 7th employee on the list every 10th employee is selected thereafter. Thus the selected employees are the 7th 17th 27th 37th and so on until a total of 50 employees are included in the sample. The random start ensures impartiality while the systematic selection makes the process simple and efficient.*

#### **5. Stratified Random Sampling**

In stratified random sampling the population is first divided into homogeneous subgroups called strata based on relevant characteristics such as age gender or income. The procedure involves determining the proportion of each stratum in the population and then randomly selecting samples from each stratum using simple random methods. This ensures that all important subgroups are adequately represented while maintaining randomness within each group.

**Example:** *A researcher wants to study academic performance of college students in an institution that has 1,000 students. The population consists of three academic streams: Arts Science and Commerce. There are 400 Arts students 350 Science students and 250 Commerce students. For this, first the population is divided into three homogeneous strata based on academic stream. Next the researcher decides to select a sample of 100 students. Proportional*

*allocation is used to determine the sample size from each stratum. Accordingly 40 students are selected from Arts 35 from Science and 25 from Commerce. Within each stratum all students are assigned unique numbers. Using a randomisation method such as the lottery method or computer generated random numbers the required number of students is selected separately from each stratum. This procedure ensures that every student within each stream has an equal chance of selection while all streams are proportionately represented in the final sample.*

## **6. Cluster Random Sampling**

Cluster random sampling involves dividing the population into natural groups or clusters such as schools villages or departments. The procedure includes listing all clusters and then randomly selecting a certain number of clusters using random methods. All elements within the selected clusters or a random sample from them are included in the study. This technique is useful when the population is geographically dispersed and a complete list of individuals is difficult to obtain.

**Example:** *A researcher wants to study health awareness among rural households in a district that contains 120 villages. Preparing a complete list of all individual households in the district is difficult and time consuming. Therefore the researcher treats each village as a cluster. First a list of all 120 villages is prepared and each village is assigned a unique number from 1 to 120. Using a randomisation method such as a lottery method or computer generated random numbers the researcher randomly selects 10 villages from the list. All households within the selected 10 villages are then included in the study or alternatively a simple random sample of households is drawn from each selected village. Since the clusters are chosen purely by chance each village has an equal probability of being selected ensuring randomness in the sampling process.*

These techniques of randomisation play a vital role in ensuring fairness objectivity and scientific accuracy in sample selection. By giving every unit of the population an equal chance of inclusion these techniques minimize selection bias and enhance the reliability and validity of research findings. Methods such as simple random sampling, random number tables, computer generated random numbers, stratified random sampling, cluster sampling and systematic sampling with random start provide researchers with flexible and effective ways to achieve true randomness under different research conditions. The appropriate use of randomisation techniques strengthens

the credibility of research and supports meaningful generalization of results to the wider population.

### 3.6 Summing Up

The following areas have been covered in this unit:

- The unit has highlighted the concept of one important sampling technique. i.e.-the representative sampling. Representative sampling refers to a sampling approach in which the selected sample accurately reflects the characteristics structure and diversity of the entire population under study. The main purpose of representative sampling is to ensure that the findings obtained from the sample can be generalized to the population with a high degree of confidence.
- A representative sample is one that *mirrors the population* in terms of key variables that are relevant to the research objectives. This means that no significant group within the population is overrepresented or underrepresented.
- In research methodology representative sampling is especially important especially in social science, health, education and market research where population characteristics significantly influence outcomes.
- The nature of representative sampling is defined by several key features that ensure reliability, validity and generalizability of research findings. Few include- it reflects Population Characteristics, it focuses on Key Variables, it makes use of Structured Sampling Techniques and so on.
- Representative sampling involves careful planning and execution to ensure that the selected sample accurately mirrors the population. The components of representative sampling provide the framework for designing a sample that is unbiased, valid, and generalizable. The key components include-Target population, Sampling size, sampling frame , sampling techniques, randomization etc.

- The unit also highlighted the difference between two commonly used sampling approaches are representative sampling and random sampling. Although they share some similarities, they differ in purpose, design, and application.
- Randomisation is a fundamental concept in research methodology that refers to the process of assigning or selecting participants purely by chance rather than by choice or judgment. The main objective of randomisation is to eliminate bias and ensure fairness in the selection or allocation process.
- Various methods are used to achieve randomisation including the lottery method random, number tables, computer generated random numbers and systematic procedures with random starts.

### 3.7 References and Suggested Readings

- Basavayya, D., & Venkataiah, N. (2016). *Essence of educational research methodology*. Neel Kamal Publication Pvt. Ltd.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- Daroga, S., & Chaudhary, F. S. (2002). *Theory & analysis of sample survey designs*. New Age International Publishers Ltd.
- Kothari, C. R., & Garg, G. (2019). *Research methodology: Methods and techniques* (4th ed.). New Age International Publishers.
- Koul, L. (2019). *Methodology of educational research* (5th ed.). Vikas Publishing House Pvt. Ltd.
- Savitha, G., Prasad, P., Vijyata, A., Sharma, A., & Kandikota, A. (2024). *A textbook on research methodology*. KD Publications.

### 3.8 Model Questions

1. What is meant by Representative Sampling?

2. Define randomization in sample selection
3. State any three characteristics of Representative Sampling
4. Briefly explain the importance of randomization in research
5. Explain the nature of Representative Sampling with suitable points
6. Discuss cluster random sampling and its suitability in large populations
7. Explain the meaning and nature of Representative Sampling. Discuss its role in ensuring validity of research findings
8. Compare Representative Sampling and Random Sampling in detail with examples
9. Describe the various techniques of randomization in sample selection. Explain their procedures and applicability
10. Critically examine the role of randomization in achieving unbiased and reliable research outcomes

### **3.9 Answer to Check Your Progress/Possible Answers to SAQ**

**Answer to question 1:** Representative sampling refers to a sampling approach in which the selected sample accurately reflects the characteristics structure and diversity of the entire population under study. The main purpose of representative sampling is to ensure that the findings obtained from the sample can be generalized to the population with a high degree of confidence.

**Answer to question 2:**

**Few nature of representative sampling includes the following:**

#### **1. It makes use of Structured Sampling Techniques**

Techniques like stratified sampling or quota sampling are often used to ensure proportional representation of subgroups.

## **2. It enhances Research Validity**

Accurate representation of population diversity improves external validity and strengthens credibility.

## **3. It ensures Inclusiveness of Subgroups**

All significant subgroups of the population are fairly included, capturing diversity within the population in this sampling.

### **Answer to SAQ1:**

Few components of representative sampling:

#### **1. Target Population**

The target population is one of the key components of representative sampling. It means the complete set of individuals, objects or events that the researcher intends to study. Clearly defining the target population is critical because it sets the boundaries for whom or what is eligible to be included in the study.

#### **2. Sampling Frame**

The sampling frame comprises another key component of representative sampling. It is a complete and up-to-date list or database of all the elements within the target population. It serves as the source from which the sample is drawn. A well-prepared sampling frame ensures that every element in the population has a chance of selection and prevents coverage errors that can lead to bias.

#### **3. Sample Size**

Sample size refers to the number of elements selected from the population for the study. Choosing an appropriate sample size is crucial to ensure that it is large enough to capture the diversity of the population while remaining manageable for analysis. A sample that is too small may lead to inaccurate or unreliable results, again an excessively large sample can be costly and unnecessary.

## UNIT- 4

### SAMPLE SIZE, RANDOM SAMPLING ERRORS AND ITS IMPORTANCE FOR DRAWING INFERENCES

#### Unit Structure:

4.1 Introduction

4.2 Objectives

4.3 Meaning and concept of Sample Size

4.3.1 Determination of Sample Size

4.4 Random Sampling errors

4.4.1 Techniques to eliminate Random sampling errors

4.5 Importance of Sampling Errors for Drawing Inferences

4.6 Summing Up

4.7 References and Suggested Readings

4.8 Model Questions

4.9 Answer to Check Your Progress/Possible Answers to SAQ

#### 4.1 Introduction

The study of sampling is going on. In the preceding unit, you were introduced to the concept of randomisation and the various techniques used to achieve it. Randomisation is a crucial method for controlling sampling error and enhancing the quality of research findings. By selecting participants randomly, every member of the population is given an equal chance of inclusion in the sample. This approach helps to minimise systematic bias and ensures that both known and unknown characteristics are more evenly distributed within the sample.

In this context, sampling error becomes a central concept in the entire sampling process of research methodology. Closely related to sampling error is the concept of sample size, as the magnitude of sampling error is influenced by the number of units included in the sample. Therefore, a clear understanding of randomisation, sampling error, and sample size is essential for conducting sound research and for accurately interpreting research findings. This unit will deal with the concepts of sample size, sample error and its importance in drawing inferences in research studies.

## 4.2 Objectives

After going through this unit, you will be able to—

- *explain* the concept of sample size and its determination;
- *discuss* about sampling error and its types
- *explain* about Non-sampling error
- *elaborate* the concept of random sampling error;
- *identify* the techniques to eliminate random sampling error
- *elaborate* the importance of sampling error in drawing inferences.

## 4.3 Meaning and Concept of Sample Size

Sample size is one of the key concepts in the process of research. The concept of sample size in research refers to the careful determination of the number of units participants or observations to be included in a study so that valid reliable and generalisable conclusions can be drawn about the population. Since it is often impractical to study an entire population, researchers generally rely on samples that adequately represent the population under investigation. Therefore the fixation of an appropriate sample size is a critical step in the research process.

Sample size is denoted as '**n**'. An adequate sample size depends on clear information about the research problem and the characteristics of the population being studied. It is influenced by factors such as the need for sub classifications for analysis the degree of variation in the population the desired level of precision availability of subjects and the cost of investigation. Data collected from the selected sample are usually recorded using pre designed schedules or questionnaires the design of which depends on the objectives of the study and the facilities available for analysis.

Sample size determination is the technique of selecting the number of observations to be included in a sample. It is a vital feature of any study that aims at making inferences about a population based on sample data. In general, sample size is decided by balancing the cost of data collection and the requirement for sufficient statistical power. In more advanced studies different sample sizes may be used within the same research.

Larger sample sizes usually result in greater precision when estimating unknown population parameters. This relationship is supported by fundamental principles of mathematical statistics such as the law of large numbers and the central limit theorem. Sample sizes are commonly determined using three main approaches. The *cost based approach* focuses on selecting samples that are convenient and economical though small samples may lead to wide confidence intervals and higher risks of error. The *variance based approach* uses a target level of variance for the estimate to be obtained. The *statistical power based approach* determines sample size based on the ability of a statistical test to detect meaningful effects.

The sample size is judged by the quality of the estimates it produces and the power of the statistical tests applied. An appropriately chosen sample size improves accuracy reduces sampling error and strengthens the reliability of research findings. Thus selecting the correct sample size is a fundamental aspect of research methodology and it directly affects the validity and credibility of the conclusions drawn from a study.

### **Components of Sample Size:**

Key Aspects of Sample Size include the following:

#### **1. Representation**

An appropriate sample size ensures that the selected sample adequately represents the characteristics of the entire population such as age gender, socio economic status and other relevant traits. Better representation increases the generalisability of research findings.

#### **2. Statistical Significance**

Sample size plays a vital role in determining whether the observed results are due to chance or reflect a true effect. Larger sample sizes generally provide greater statistical power enabling researchers to detect meaningful differences or relationships more accurately.

#### **3. Precision and Margin of Error**

Larger samples produce more precise estimates of population parameters and result in smaller margins of error. This means that the study findings are more likely to be close to the true values of the population.

#### **4. Variability**

The degree of variability within a population influences the required sample size. Populations with greater diversity or higher variability require larger sample sizes to adequately capture the full range of characteristics present in the population.

## **5. Sampling Error**

Sample size directly affects sampling error. Larger samples tend to reduce sampling error making the estimates more stable and closer to the true population values.

## **6. Statistical Power**

Adequate sample size ensures sufficient power of statistical tests to detect real effects or differences when they exist. Insufficient sample size may lead to false negative results.

## **7. Feasibility and Cost**

While larger samples improve accuracy they also require more time resources and cost. Sample size must therefore balance statistical requirements with practical constraints.

## **8. Type of Research Design**

The required sample size varies according to the research design such as survey experimental or qualitative studies. Experimental studies may need separate sample sizes for different groups while survey studies may require larger samples for population level inference.

## **9. Level of Confidence**

The confidence level chosen by the researcher influences sample size. Higher confidence levels generally require larger samples to ensure reliable conclusions.

These components of sample size collectively determine the quality and credibility of research findings. Proper consideration of representation, statistical significance, precision, variability, sampling error and statistical power etc. ensures that the sample accurately reflects the population and that the results obtained are meaningful and reliable. When these components are carefully integrated the chosen sample size strengthens the validity and overall effectiveness of the research study.

### **Check Your Progress:**

1. What is meant by sample Size?
2. State few components of sample size.

### 4.3.1 Determination of Sample Size:

The determination of sample size depends upon the desired precision and cost. Normally, one of these will be fixed to find the suitable sample size to draw the sample units. The precision is surely specified in terms of the margin of errors permissible in the estimate and the coefficient of confidence with which one wants sure that the estimate is within the permissible margin of error. Thus, if the error permissible is the estimate of the population value of the mean is say  $D$  and the degree of assurance is 95%, then the sample size,  $n$  is given by

$$n = (1.96)\sigma^2 / D^2$$

Here, the value of  $\sigma^2$  (population variance) will be obtained with previous knowledge or through pilot study. In this way, we can find the sample size, so as to keep the error in the desired limits.

#### **Sample Size determination is computed using three inputs:**

1. The estimate of the population standard deviation (often obtained from earlier studies).
2. The acceptable level of sampling error
3. The desired confidence level

#### **1. Estimate of the Population Standard Deviation**

The population standard deviation reflects the degree of variability present in the population. When variability is high the data values are widely spread and a larger sample size is required to capture this variation accurately. Since the true population standard deviation is often unknown it is usually estimated from previous studies pilot surveys or past research conducted on similar populations. A higher estimated standard deviation leads to a larger required sample size while lower variability allows for a smaller sample.

#### **2. Acceptable Level of Sampling Error**

The acceptable level of sampling error also known as the margin of error represents the maximum difference the researcher is willing to tolerate between the sample estimate and the true population value. A smaller acceptable error indicates a desire for greater precision which requires a larger sample size. Conversely allowing a larger margin of error reduces the required sample size but also lowers the precision of the results.

### **3. Desired Confidence Level**

The confidence level indicates the degree of certainty that the true population parameter lies within the specified margin of error around the sample estimate. Commonly used confidence levels are 90 percent 95 percent and 99 percent. Higher confidence levels require larger sample sizes because they demand greater assurance that the sample results accurately reflect the population. A lower confidence level reduces the required sample size but also decreases the reliability of the conclusions.

All these three inputs balance precision reliability and feasibility. By carefully selecting appropriate values for population variability sampling error and confidence level researchers can determine a sample size that produces accurate trustworthy and practical research outcomes. while deciding the sample size, generally we should try to minimize both sample error and non-sampling errors (errors occurring during collection, analyzing the data etc.)

### **Techniques of Sample Size Determination**

Sample size determination involves the use of systematic techniques to decide the number of units participants or observations to be included in a study. These techniques help ensure that the sample is adequate to produce reliable valid and generalisable results while remaining feasible in terms of time cost and resources. The major techniques of sample size determination are as bellow:

#### **1. Cost Based Technique**

In this technique the sample size is determined by practical considerations such as availability of subjects time constraints and financial resources. Researchers include as many units as can be conveniently collected within the available budget.

#### **2. Variance Based Technique**

This technique determines sample size on the basis of the variability present in the population. When the population shows greater variation a larger sample size is required to obtain stable and accurate estimates. A target level of variance or standard error is fixed in advance and the sample size is calculated accordingly.

### **3. Statistical Power Based Technique**

The statistical power based technique focuses on determining a sample size that provides adequate power to detect true differences or relationships if they exist. The researcher specifies the desired power level significance level and expected effect size and the required sample size is calculated to meet these criteria. This technique is widely used in experimental and analytical studies.

### **4. Precision or Margin of Error Technique**

In this method the sample size is decided based on the level of precision required in the estimates. Researchers fix an acceptable margin of error and confidence level and then determine the sample size needed to achieve that degree of accuracy.

### **5. Census or Complete Enumeration**

When the population size is small or complete information is required data are collected from every unit of the population. In such cases the sample size is equal to the population size and no sampling is involved.

### **6. Stratified Sample Size Technique**

In studies using stratified sampling the total sample size is divided among different strata based on their proportion size or variability. Each stratum may have a different sample size to ensure adequate representation and accurate subgroup analysis.

In practical application, researchers often combine more than one technique to determine an appropriate sample size. By carefully applying these techniques researchers can balance statistical accuracy with practical feasibility and enhance the overall quality of the research findings.

### **4.4 Random Sampling Errors**

In the discussion of sample size, we have come across the term sampling error, which is closely related to the sampling process. Before going into the random sampling error, you must have clear idea about sampling error.

**Sampling error** refers to the difference between the true value of a population parameter and the value estimated from a sample. This error arises because a sample includes only a part of

the population rather than the entire population. As a result the findings obtained from the sample may not perfectly reflect the characteristics of the population. Sampling error is therefore an inherent and unavoidable aspect of research whenever sampling is used instead of complete enumeration.

The principal sources of sampling error are the sampling method adopted and the size of the sample. Different sampling methods produce different levels of sampling error even when the sample size remains the same. For instance simple random sampling may result in higher sampling error than stratified random sampling when the population is heterogeneous because stratification ensures better representation of diverse subgroups. Sample size also has a direct influence on sampling error as larger samples generally lead to more accurate estimates and reduced error while smaller samples are more affected by chance variation.

Sampling error occurs when the selected sample does not accurately represent the population. Even when random sampling techniques are used sampling error cannot be completely eliminated because random samples are only approximations of the population. However the likelihood and magnitude of sampling error can be reduced through proper randomisation suitable sampling design and adequate sample size.

In practice researchers must balance the cost and feasibility of conducting a census against the potential for sampling error. A census eliminates sampling error but may increase non sampling errors and is often costly and time consuming especially for large populations. Sampling error is therefore accepted as a manageable limitation of research and through careful sampling design its impact can be minimized while still producing reliable and generalisable results.

### **Types of Sampling Error**

Sampling errors occur when a sample does not accurately represent the population from which it is drawn. These errors arise due to the method of sampling the size of the sample and chance variations. The major types of sampling error are as follows:

#### **1. Population Specific Error**

Population specific error occurs when the defined population does not properly match the population to which the researcher intends to generalise the findings. If important elements of

the population are excluded or incorrectly included the sample results will be biased and unrepresentative.

## **2. Selection Error**

Selection error arises when the procedure used to select the sample leads to systematic bias. This may occur if the selection process is not truly random or if certain members of the population have a higher chance of being included than others. As a result the sample does not accurately reflect the population.

## **3. Sample Frame Error**

Sample frame error occurs when the sampling frame from which the sample is drawn is incomplete outdated or inaccurate. If some members of the population are missing from the sampling frame or are listed more than once the resulting sample will be distorted.

## **4. Non Response Error**

Non response error occurs when individuals selected for the sample does not respond or refuse to participate and their characteristics differ from those who do respond. This leads to a sample that may not truly represent the population even though the initial selection was appropriate.

## **5. Random Sampling Error**

Random sampling error arises due to chance variation when different random samples are drawn from the same population. Even with proper randomisation different samples will produce slightly different results. This type of error decreases as sample size increases.

Hence, sampling errors can take several forms depending on population definition sampling design and response behaviour. Understanding these types of sampling error will help you to design better studies, reduce bias and improve the accuracy and reliability of your research findings.

## **Non Sampling Error:**

This is another concept related to sampling error. Non sampling error refers to errors in research that arise from sources other than the process of selecting a sample. These errors can occur in both sample surveys and complete censuses and therefore are not eliminated by

increasing the sample size. Non sampling errors affect the accuracy, reliability and validity of research findings and are often more serious than sampling errors because they may introduce systematic bias into the results.

Non sampling errors may occur at any stage of the research process including problem definition, questionnaire design, data collection, data processing, analysis and interpretation. They arise mainly due to faulty research design improper execution of the study and human factors involved in data collection and handling. Broadly non sampling errors can be *classified* into –

- a) Respondent errors and
- b) Administrative errors.

**a) Respondent errors:** These include non response error where selected respondents fail to provide information and response bias where respondents provide inaccurate or misleading information either deliberately or unintentionally. These errors may occur due to lack of interest sensitivity of questions misunderstanding of questions or the influence of the interviewer.

**b) Administrative errors:** Administrative errors arise due to improper management of the research process. These include sample selection error investigator error investigator cheating and data processing error. Such errors may occur when the sampling plan is poorly executed information is incorrectly recorded data are falsified or mistakes are made during editing coding and analysis.

Non-sampling error represents all inaccuracies in research data that are not caused by sampling. Since these errors cannot be reduced by increasing sample size they must be controlled through careful research design, well constructed questionnaires, proper training and supervision of investigators, effective follow up of respondents and accurate data processing procedures.

### **Random Sampling Error:**

Random sampling error is a major type of sampling error. Sampling error and random sampling error are used interchangeably, but not exactly the same. All random sampling error

is sampling error but not all sampling error is random. Sampling error can also be influenced by non random factors such as biased selection procedures or inadequate sample size. Random sampling error specifically emphasizes the variability caused by chance alone under random sampling conditions.

Random sampling error refers to the variation that occurs in sample results purely due to chance when a sample is drawn randomly from a population. Even when proper randomisation techniques are used and bias is completely avoided different random samples selected from the same population are likely to produce slightly different estimates of population characteristics. This difference between the sample estimate and the true population value that arises only because of chance variation is known as random sampling error.

Random sampling error is inherent in all sample based studies and cannot be completely eliminated as long as sampling is used instead of a census. It occurs because a sample represents only a portion of the population and each random draw may include different combinations of population elements. However the magnitude of random sampling error can be controlled and reduced through appropriate research design.

Ensuring proper randomisation during sample selection is also essential. Each unit in the population must have an equal and independent chance of being selected. Faulty or partial randomisation can increase error and introduce bias which further distorts results.

In statistical analysis random sampling error can be quantified using measures such as standard error confidence intervals and significance tests. While these methods do not eliminate the error they help researchers understand the extent of uncertainty in their estimates.

#### **Check Your Progress**

Q.3. What is meant by Non-sampling Error?

Q.4. What are the types of sampling error?

#### **4.4.1 Techniques to Eliminate Random Sampling Error**

Random sampling error arises due to chance variation when a sample is drawn from a population. While it cannot be completely eliminated unless a census is conducted its

magnitude can be effectively reduced by applying appropriate techniques. The major techniques to eliminate random sampling error are as follows:

### **1. Increasing the Sample Size**

The most effective method to reduce random sampling error is to increase the sample size. Larger samples tend to better represent the population and reduce the effect of chance fluctuations. As sample size increases the estimates become more stable and precise.

### **2. Using Stratified Random Sampling**

Stratified random sampling reduces random sampling error by dividing the population into relatively homogeneous subgroups or strata and selecting samples from each stratum. This ensures adequate representation of all important groups and reduces variability within samples.

### **3. Ensuring Proper Randomisation**

Proper randomisation ensures that every unit in the population has an equal and independent chance of being selected. True random selection methods such as random number tables or computer generated random numbers help reduce error arising from unequal selection chances.

### **4. Reducing Population Variability through Control**

Random sampling error can be eliminated when researchers can reduce variability by selecting more homogeneous populations or by controlling extraneous variables especially in experimental studies. Lower variability leads to smaller random sampling error.

### **5. Through use of Appropriate Sampling Frames**

An accurate complete and up to date sampling frame ensures that all population elements have a chance of selection. This improves representativeness and helps reduce error associated with chance omissions or duplications.

### **6. Application of Statistical Techniques**

Statistical tools such as confidence intervals, standard error estimation and weighting adjustments help assess and correct for random variation in sample results. While these

techniques do not remove the error they help in understanding and minimising its impact on conclusions.

## 7. Replication of Studies

Repeating studies using different random samples and comparing results helps average out random sampling error and increases confidence in the findings.

Random sampling error cannot be entirely eliminated unless a complete census is conducted. However through adequate sample size, appropriate sampling design and proper randomization, the impact of random sampling error can be significantly reduced which will allow researchers to draw reliable and valid conclusions from sample data.

### Self-Assessment Question

Q.1 How would you differentiate sampling error from non-sampling error?

.....  
.....  
.....

## 4.5 Importance of Sampling Errors for Drawing Inferences

This unit has highlighted on the sampling error. We have come to know that in research, sampling errors are the differences between the estimates obtained from a sample and the true values of the population. Understanding sampling errors is crucial because all conclusions drawn from sample data are subject to some degree of error. In the discussion of sampling error, you must know and understand how these sampling error aids in drawing inferences in research study. Sampling error serves as a force in drawing inferences in the following ways:

### 1. Assessing Accuracy of Estimates

Sampling error provides a measure of how closely the sample estimate reflects the true population parameter. By quantifying sampling error, researchers can evaluate the reliability of the findings. Large sampling error would indicate that the actual population preference could be much higher or lower, prompting caution in drawing conclusions.

## **2. Determining Sample Size**

Understanding sampling error is essential in deciding the appropriate sample size. A smaller sampling error requires a larger sample to ensure the estimate is close to the true population value. For instance, in political polling, reducing sampling error increases confidence that the poll results represent the voting population accurately.

## **3. Enhancing Statistical Significance**

Sampling error directly impacts on drawing inferences in research. Lower sampling errors increase the likelihood that observed differences or relationships in the data are real and not due to chance.

## **4. Evaluating Confidence Levels**

Sampling error is used to calculate confidence intervals, which indicate the range within which the true population value is likely to fall. For example, a consumer survey may report that  $45\% \pm 5\%$  of customers prefer a product with 95% confidence. The  $\pm 5\%$  margin reflects the sampling error and helps decision-makers interpret results accurately.

## **5. Comparing Sampling Methods**

Different sampling methods produce varying degrees of sampling error. Understanding these errors helps the researchers to choose the most appropriate method. For example, stratified random sampling often reduces sampling error compared to simple random sampling in heterogeneous populations, ensuring more representative results. As such it helps in drawing conclusion.

## **6. Interpreting of Research Findings**

Sampling error acts as guide in interpreting the research findings. Recognizing the presence of sampling error prevents overgeneralization from sample results. Researchers can interpret findings cautiously and indicate the possible range of variation in the population, reducing the risk of incorrect conclusions.

## **7. Supporting Statistical Inferences**

Sampling error helps the researcher to determine the reliability of statistical tests and estimates. By accounting for sampling error, researchers can make valid inferences and avoid drawing misleading conclusions based on random variation in the sample.

## **8. Facilitating Research Planning and Resource Allocation**

Understanding sampling error allows researchers to plan studies efficiently as well as balancing accuracy with time, cost and resources. Proper consideration of sampling error ensures that research is feasible and producing trustworthy results.

Hence, it can be asserted that as sampling error measures the uncertainty involved in utilizing samples to infer population characteristics, it is a crucial notion in research technique. Researchers may create better studies, pick appropriate sample sizes and sampling techniques, and draw more accurate and trustworthy conclusions about the population by comprehending and controlling sampling errors.

### **4.6 Summing Up**

We have come to the end of this unit. As such a quick review can be made in the following ways:

- The concept of sample size in research refers to the careful determination of the number of units participants or observations to be included in a study so that valid reliable and generalisable conclusions can be drawn about the population.
- Sample size is denoted as 'n'. An adequate sample size depends on clear information about the research problem and the characteristics of the population being studied. It is influenced by factors such as the need for sub classifications for analysis the degree of variation in the population the desired level of precision availability of subjects and the cost of investigation.
- Key Aspects of Sample Size include- Representation, Statistical Significance, Sampling Error, Level of Confidence, variability etc.
- The determination of sample size depends upon the desired precision and cost. Normally, one of these will be fixed to find the suitable sample size to draw the sample units. Sample Size determination is computed using three inputs: 1. The estimate of the population standard deviation (often obtained from earlier studies). 2. The acceptable level of sampling error and 3. The desired confidence level

- Sample size determination involves the use of systematic techniques to decide the number of units participants or observations to be included in a study. These are- Cost Based Technique, Variance Based Technique, Statistical Power Based Technique etc.
- Sampling error refers to the difference between the true value of a population parameter and the value estimated from a sample. This error arises because a sample includes only a part of the population rather than the entire population.
- The major types of sampling error are- Population Specific Error, Selection Error, Sample Frame Error, Non Response Error, Random Sampling Error
- Non sampling error refers to errors in research that arise from sources other than the process of selecting a sample. These errors can occur in both sample surveys and complete censuses and therefore are not eliminated by increasing the sample size.
- Random sampling error is inherent in all sample based studies and cannot be completely eliminated as long as sampling is used instead of a census. It occurs because a sample represents only a portion of the population and each random draw may include different combinations of population elements.
- Random sampling error cannot be entirely eliminated unless a complete census is conducted. However through adequate sample size, appropriate sampling design and proper randomization, the impact of random sampling error can be significantly reduced.
- Sampling error aids in drawing inferences in research study. Sampling error serves as a force in drawing inferences in numbers of way like-deciding the sample size, supporting statistical findings, interpreting result and so on.

#### **4.7 References and Suggested Readings**

- Basavayya, D., & Venkataiah, N. (2016). *Essence of educational research methodology*. Neel Kamal Publication Pvt. Ltd.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.

- Daroga, S., & Chaudhary, F. S. (2002). *Theory & analysis of sample survey designs*. New Age International Publishers Ltd.
- Kothari, C. R., & Garg, G. (2019). *Research methodology: Methods and techniques* (4th ed.). New Age International Publishers.
- Koul, L. (2019). *Methodology of educational research* (5th ed.). Vikas Publishing House Pvt. Ltd.
- Malhotra, N.K. and Dash, S. (2011). *Marketing research: An Applied Orientation* (6th edition), New Delhi: Pearson Education
- Savitha, G., Prasad, P., Vijyata, A., Sharma, A., & Kandikota, A. (2024). *A textbook on research methodology*. KD Publications.

#### **4.8 Model Questions**

1. What is meant by sample size in research?
2. What is random sampling error?
3. Explain the concept and importance of sample size in research studies.
4. What are the major factors involved in the determination of sample size?
5. Differentiate between sampling error and non sampling error.
6. Explain random sampling error and describe the techniques used to eliminate or minimise it.
7. Explain the types of sampling errors.
8. Discuss the process of sample size determination and explain the role of sampling error and confidence level in it.
9. Explain the importance of sampling errors for drawing valid inferences in research. Illustrate your answer with suitable examples.

#### **4.9 Answer to Check Your Progress/Possible Answers to SAQ**

**Answer to Q. 1:** Sample size is one of the key concepts in the process of research. Sample size is denoted as 'n'. An adequate sample size depends on clear information about the research problem and the characteristics of the population being studied. It is influenced by factors such as the need for sub classifications for analysis the degree of variation in the population the desired level of precision availability of subjects and the cost of investigation.

**Answer to Q. 2:** Few components of Sample size include:

##### **1. Representation**

An appropriate sample size ensures that the selected sample adequately represents the characteristics of the entire population such as age gender, socio economic status and other relevant traits. Better representation increases the generalisability of research findings.

##### **2. Statistical Significance**

Sample size plays a vital role in determining whether the observed results are due to chance or reflect a true effect. Larger sample sizes generally provide greater statistical power enabling researchers to detect meaningful differences or relationships more accurately.

##### **3. Precision and Margin of Error**

Larger samples produce more precise estimates of population parameters and result in smaller margins of error. This means that the study findings are more likely to be close to the true values of the population.

**Answer to Q. 3:** Non sampling error refers to errors in research that arise from sources other than the process of selecting a sample. These errors can occur in both sample surveys and complete censuses and therefore are not eliminated by increasing the sample size.

**Answer to Q.4:**

The major types of sampling error are as follows:

##### **1. Population Specific Error**

Population specific error occurs when the defined population does not properly match the population to which the researcher intends to generalise the findings.

## **2. Selection Error**

Selection error arises when the procedure used to select the sample leads to systematic bias.

## **3. Sample Frame Error**

Sample frame error occurs when the sampling frame from which the sample is drawn is incomplete outdated or inaccurate.

## **4. Non Response Error**

Non response error occurs when individuals selected for the sample does not respond or refuse to participate and their characteristics differ from those who do respond.

## **5. Random Sampling Error**

Random sampling error arises due to chance variation when different random samples are drawn from the same population.

**Answer to SAQ 1:** Sampling error and non sampling error differ mainly in their source and nature. Sampling error arises because a study is based on a sample rather than the entire population and represents the difference between the sample estimate and the true population value. It is inherent in all sample based studies can be measured statistically and generally decreases as the sample size increases. Non sampling error on the other hand arises from factors unrelated to sample selection such as faulty research design poor questionnaire construction respondent bias interviewer mistakes non response and data processing errors. Unlike sampling error non sampling error can occur even in a complete census cannot be easily measured and is not reduced by increasing sample size.

---X---

## UNIT- 5

### TOOLS OF EDUCATIONAL RESEARCH- OBSERVATION SCHEDULE, QUESTIONNAIRE, INTERVIEW SCHEDULE, INQUIRY FORMS

#### Unit Structure:

- 5.1 Introduction
- 5.2 Objectives
- 5.3 Meaning of Tools of Educational Research
  - 5.3.1 Significance of Tool in Educational Research
- 5.4 Observation Schedule as tool of Educational Research
- 5.5 Questionnaire as tool of Educational Research
- 5.6 Interview Schedule as tool of Educational Research
- 5.7 Inquiry Forms as tool of Educational Research
- 5.8 Summing Up
- 5.9 References and Suggested Readings
- 5.10 Model Questions
- 5.11 Answer to Check Your Progress/Possible Answers to SAQ

#### 5.1 Introduction

Educational research is fundamentally concerned with the systematic generation of knowledge that can enhance educational theory, inform practice and guide policy decisions. It seeks to investigate educational processes, behaviours, and outcomes through scientific inquiry grounded in objectivity, logic, and empirical evidence. Central to this inquiry is the process of data collection, through which abstract educational phenomena are transformed into analyzable information. The effectiveness of any research endeavour therefore depends not only on the soundness of its design but also on the appropriateness of the tools employed to gather data. As Best and Kahn (2016) note, “The validity and reliability of any research study depend largely upon the appropriateness and precision of the tools used for data collection” (p. 200).

Research tools in education refer to the instruments and techniques used by researchers to collect, measure and analyze information relevant to a given problem. They provide the means through which facts, opinions, attitudes, behaviours and experiences of individuals or groups are systematically recorded. As educational settings are complex and dynamic, involving diverse learners, teachers and institutions, the careful selection and construction of research tools is essential to ensure accuracy, reliability and validity of findings. There are variety of tools that are used in research. Among the various tools used in educational research, observation schedules, questionnaires, interview schedules and inquiry forms occupy a prominent place. Each tool reflects a distinct methodological approach and is suited to specific research purposes and contexts. The research tools form the backbone of empirical investigation in education. They are not merely devices for data collection but essential instruments that shape the quality and credibility of research outcomes. A clear understanding of their nature, purpose and proper use is indispensable for conducting meaningful and methodologically sound educational research. This unit will focus on the major research tools used in educational research.

## 5.2 Objectives

After going through this unit, you will be able to—

- *discuss* meaning and significance of tools of Educational research;
- *explain* the Observation schedule as a tool of Educational Research;
- *elaborate* the Questionnaire tool of Educational Research;
- *discuss* the Interview schedule as a tool of Educational Research;
- *highlight* the Inquiry Forms tools for educational research

## 5.3 Meaning of Tools of Educational Research

Tools of Educational Research are the essential instruments and techniques through which data are systematically collected, organized and interpreted in the study of educational problems. They serve as the practical means by which researchers obtain factual information,

opinions, attitudes, experiences and behavioural patterns related to teaching, learning and educational administration. Since educational research deals with complex human behaviour and diverse institutional contexts, these tools help bring structure, precision and scientific rigor to the investigative process. By transforming intangible educational variables into measurable data, research tools enable researchers to test hypotheses, answer research questions and draw valid conclusions.

The concept of research tools in education also emphasizes their role in ensuring objectivity and standardization. Well-designed tools minimize personal bias, reduce errors in data collection and allow for consistency across different respondents and settings. Their proper use enhances the reliability and validity of research outcomes, making findings dependable and generalizable. Moreover, tools of educational research are selected based on the nature of the problem, the objectives of the study and the characteristics of the population under investigation. Thus, tools of educational research are not merely data-gathering devices but integral components that determine the quality, credibility and scientific value of educational research.

### **The key aspects of tools of Educational Research:**

There are various key issues involved in tools of educational research. These highlight their role in ensuring systematic, scientific and meaningful investigation of educational problems. The major aspects include the following:

#### **1. Objectivity**

Research tools should collect data in an unbiased and neutral manner. Objectivity ensures that personal opinions or prejudices of the researcher do not influence the data, leading to accurate and trustworthy findings.

#### **2. Validity**

Validity refers to the extent to which a tool measures what it is intended to measure. A valid research tool accurately represents the educational variable under study, such as achievement, attitude or interest.

### **3. Reliability**

Reliability denotes the consistency and stability of a research tool. A reliable tool produces similar results when administered under similar conditions, ensuring dependability of the data.

### **4. Standardization**

Standardization involves uniform procedures in administering, scoring and interpreting a research tool. This ensures consistency across different respondents and research settings.

### **5. Practicality and Usability**

Research tools should be easy to administer, economical in terms of time and resources and suitable for the target population. Practical tools increase response accuracy and participation.

### **6. Sensitivity**

Sensitivity refers to the ability of a tool to detect subtle differences or changes in educational variables. A sensitive tool captures variations in behaviour, performance or attitudes effectively.

### **7. Appropriateness to the Research Problem/study area**

The tool must align with the nature, objectives and scope of the research. Selecting an appropriate tool ensures relevance and meaningful data collection.

### **8. Ethical Considerations**

Research tools must respect ethical principles such as confidentiality, informed consent and voluntary participation. Ethical tools protect the rights and dignity of respondents.

### **9. Accuracy and Precision**

A good research tool provides precise and accurate measurements, reducing errors and enhancing the credibility of the research findings.

### **10. Adaptability**

Research tools should be flexible enough to be modified or adapted according to different cultural, social and educational contexts without compromising their reliability and validity.

These aspects collectively determine the effectiveness and scientific value of tools used in educational research.

### **5.3.1 Significance of Tool in Educational Research**

The research tools are very much significant for research study. The significance of tools of educational research lies in their vital role in ensuring the systematic, scientific and effective study of educational phenomena. They form the foundation upon which the entire research process is built and contribute directly to the quality and credibility of research outcomes. The importance of research tool can be realized in terms of the following areas:

#### **1. Ensuring Systematic Data Collection**

Research tools provide organized and structured methods for collecting data, ensuring consistency and clarity in the research process.

#### **2. Helps in Measurement of Educational Variables**

The tools help in measuring abstract concepts such as achievement, intelligence, attitude, interest, motivation and behaviour in a scientific manner.

#### **3. Ensuring Objectivity**

Standardized tools reduce personal bias and subjectivity, leading to more accurate and unbiased research findings.

#### **4. Enhancing Reliability**

Reliable tools produce consistent results when used under similar conditions, increasing the dependability of the data.

#### **5. Ensuring Validity**

The Research tools help ensures that what is intended to be measured is actually measured, thereby improving the credibility of the study.

#### **6. Facilitating Data Analysis**

Well-designed research tools generate data that can be easily classified, tabulated and analyzed using appropriate statistical techniques.

#### **7. Supporting Comparative Studies**

Standardized research tools allow comparison of data across different groups, institutions or time periods.

#### **8. Helps in Generalization of Findings**

Accurate and reliable tools make it possible to generalize research findings to a larger population.

## 9. Supporting Educational Planning and Policy

Research tools supply evidence-based data that support decision-making, curriculum development and formulation of educational policies.

Hence, we can state that tools of educational research are indispensable for producing valid knowledge, improving educational practices and advancing the field of education in a scientific and meaningful manner.

### Check Your Progress

Q.1. What is meant by Tools of Educational Research?

Q.2. List out few key aspects of Tool of Educational Research.

## 5.4 Observation Schedule as a Tool of Educational Research

Observation, as a method of data collection, is among the oldest and most fundamental scientific techniques. It entails the direct perception and systematic recording of behavioural and environmental phenomena as they occur in their natural setting. In educational contexts, observation is used to study teaching behaviour, classroom dynamics, student engagement, group interaction, and institutional processes. According to Cohen, Manion and Morrison (2018), observation “enables researchers to gain firsthand, situated insights into educational realities that may not be accessible through verbal reports” (p. 457).

Observation is not a passive act of seeing but a deliberate and structured process involving selective perception, attention, and recording. The researcher determines what to observe, how to record it, and how to interpret the observations. Therefore, observation in educational research transcends casual witnessing and becomes a systematic scientific procedure. The Observation Schedule: Definition and Construction

An observation schedule is a structured instrument or checklist used to guide and record observations systematically. It specifies the categories of behaviour to be observed, their operational definitions, and the procedures for recording frequency, duration, or quality of occurrence. It transforms raw observation into quantifiable data, enabling subsequent analysis and comparison.

**Best and Kahn (2016)** define an observation schedule as “*a systematic plan for recording behavioural data, which ensures uniformity and objectivity across different observers and occasions*” (p. 205).

Observation schedules have wide-ranging applications in educational research and are particularly valuable for the systematic study of behaviours and processes within educational settings. They are extensively used in classroom process studies to examine teacher–student interaction patterns, questioning techniques, time-on-task, classroom management strategies and the overall classroom climate. In the area of teacher evaluation and training, observation schedules provide objective and empirical data that support professional feedback, reflective practice, and instructional improvement. They are also commonly employed in behavioural studies to investigate students’ learning behaviours, attention span, peer interactions and behavioural patterns in special or inclusive education contexts. Furthermore, observation schedules play an important role in curriculum and pedagogical research by enabling researchers to analyze how educational innovations, teaching methods, or curriculum reforms are actually implemented in practice. In addition, they are used in administrative and organizational research to study leadership behaviour, staff collaboration, decision-making processes and institutional management practices. Through these varied applications, observation schedules contribute significantly to understanding and improving educational processes at multiple levels.

### **Characteristics of Observation as a Research Tool:**

Observation, as a research tool in educational studies, possesses several distinctive characteristics that make it particularly valuable for understanding real-life educational phenomena. The key characteristics are as follows:

#### **1. Direct Observation of Behaviour**

Observation enables the researcher to study behaviour as it occurs in its natural setting, providing first-hand and authentic data without relying on second-hand reports.

#### **2. Contextual Relevance**

It allows behaviour to be examined within the actual classroom or institutional environment, ensuring that findings reflect real-life educational situations and interactions.

### **3. Freedom from Response Bias**

Since data are recorded based on actual behaviour rather than self-reports, observation minimizes errors arising from social desirability, memory lapses or misinterpretation by respondents.

### **4. Flexibility in Design**

Observation can be structured or unstructured, participant or non-participant and controlled or naturalistic, making it adaptable to various research purposes and methodologies.

### **5. Systematic and Scientific Recording**

Effective observation follows a planned and systematic procedure, using observation schedules, checklists, rating scales, and coding schemes to ensure objectivity and consistency.

### **6. Suitability for Non-Verbal Behaviour**

Observation is particularly effective in capturing non-verbal aspects such as gestures, facial expressions, posture and patterns of interaction that are difficult to assess through other tools.

### **7. Continuous and Comprehensive Data Collection**

It allows the researcher to record events continuously over a period of time, providing a holistic picture of behaviour and interactions.

### **8. Immediate Data Capture**

Data are collected at the moment the behaviour occurs, reducing errors caused by recall or retrospective reporting

### **9. Applicability to Various Educational Settings**

Observation can be used in classrooms, laboratories, playgrounds and institutional environments, making it a versatile tool in educational research.

### **10. Foundation for Further Research**

Observational findings often help in generating hypotheses, designing other research tools or validating data obtained through questionnaires and interviews.

These characteristics make observation a powerful and indispensable tool for studying behaviour, interactions and processes in educational research.

## **Types of Observation in Educational Research**

Kerlinger (1986) and Tuckman (1999) categorize observation techniques into several types based on participation, structure and control:

- 1. Participant Observation:** The researcher becomes part of the group or situation being observed, allowing for a deeper understanding of internal dynamics. However, it risks researcher bias and observer effect.
- 2. Non-Participant Observation:** The researcher remains an external observer, maintaining objectivity and minimizing interference.
- 3. Structured Observation:** Here, observation categories, behaviours, and coding schemes are predefined. Structured observation is particularly valuable for quantitative studies and for ensuring inter-observer reliability.
- 4. Unstructured Observation:** Used in exploratory or qualitative research, it allows flexible, open-ended recording of events and is useful for generating hypotheses.
- 5. Controlled Observation:** Conducted under laboratory or quasi-experimental conditions, where variables can be manipulated.
- 6. Naturalistic Observation:** Conducted in real-life educational settings without manipulation, often used in ethnographic or case study research.

### **Process of Observation Schedule:**

The development of an effective observation schedule involves several key steps:

- 1. Defining the Purpose:** The researcher must identify the precise behavioural or instructional phenomena to be studied like teacher questioning techniques, student participation patterns etc.
- 2. Operationalizing Variables:** Each behaviour or event should be defined in observable and measurable terms to avoid ambiguity.
- 3. Developing Categories:** Behaviours are grouped into categories like- verbal behaviour, non-verbal cues, classroom management acts). These categories must be mutually exclusive and exhaustive.

**4. Designing the Recording Format:** The schedule should include columns or grids for coding observed events, frequencies, or durations.

**5. Pilot Testing:** The schedule is tested in a small-scale setting to check clarity, comprehensiveness and observer reliability.

**6. Training Observers:** When multiple observers are involved, inter-observer reliability must be established through training and calibration.

**7. Establishing Reliability and Validity:** Statistical techniques such as Cohen's kappa or percentage agreement may be used to assess reliability; validity may be examined through expert review or correlation with other measures.

### **Merits of Observation Schedules:**

Observation schedule serves the following benefits to researchers:

1. Observation schedules ensure objectivity by using standardized categories that reduce subjective interpretation.
2. They provide authentic data derived from real-time behaviour rather than self-reported information.
3. They offer flexibility of application and can be used in classrooms, laboratories, playgrounds, and administrative meetings.
4. Observation schedules complement interviews and questionnaires and can be triangulated to enhance the credibility of findings.
5. When conducted unobtrusively, observation minimizes respondent influence and reactivity.

### **Limitations of Observation Schedules:**

1. Observer bias may occur when the researcher's expectations or values influence what is noticed or recorded.
2. The Hawthorne effect may lead participants to modify their behaviour when they know they are being observed.

3. Observation often has a limited scope as it captures visible behaviour but not underlying motives or attitudes.
4. Systematic observation is time- and resource-intensive, requiring careful planning, training, and prolonged engagement.
5. Ethical concerns arise, particularly when observing children, as informed consent and protection of privacy are essential.

To mitigate these issues, researchers must ensure clear operational definitions, observer training, and multiple observations across different times and contexts. The observation schedule as a educational research tool provides a scientifically rigorous method for transforming complex classroom dynamics into analyzable data. When properly designed and ethically implemented, it becomes an indispensable tool for empirical inquiry in education.

<b>Self Assessment Question:</b>
<p>Q.1. Why does the tool of research considered significant in Educational Research?</p> <p>.....</p> <p>.....</p> <p>.....</p>

### **5.5 Questionnaire as tool of Educational Research**

The questionnaire as a research tool refers to a systematically prepared set of written questions designed to collect information from respondents in a structured and standardized manner. In educational research, it is used to gather data related to learners', teachers', and administrators' attitudes, beliefs, opinions, experiences, achievements and factual background information. The concept of the questionnaire is grounded in the principle of self-report, assuming that individuals are capable of providing accurate and meaningful responses when questions are clearly worded and presented in an appropriate context. As a research instrument, the questionnaire transforms abstract educational concepts such as motivation, interest, perception or teaching effectiveness into measurable variables, thereby enabling

empirical investigation. As Kerlinger (1986) defines, “a questionnaire is a set of formally structured questions designed to elicit information from respondents to be used in analysis.”

As one of the most widely used tools in survey research, the questionnaire allows researchers to collect data efficiently from large and diverse populations within a limited time and cost. Its standardized format ensures uniformity in data collection, which enhances objectivity, reliability, and comparability of responses. Moreover, questionnaires can be adapted to different research purposes like-descriptive, correlational, or evaluative and can include various types of questions such as open-ended, closed-ended, rating scales and checklists. Thus, the questionnaire is not merely a list of questions but a carefully constructed measurement tool that plays a crucial role in generating valid, generalizable, and scientifically useful data in educational research. As Cohen, Manion, and Morrison (2018) emphasize, “The quality of a questionnaire lies in its ability to translate the researcher’s theoretical concerns into empirically verifiable data” (p. 472).

### **Objectives of Using Questionnaires in Educational Research:**

In educational research, questionnaires serve multiple purposes depending on the type and scope of the study:

- 1. Descriptive Purposes:** To describe existing conditions, practices or opinions, for example, teachers’ perceptions of inclusive education or students’ study habits.
- 2. Explanatory or Co relational Purposes:** To explore relationships among variables for instance, between school climate and teacher job satisfaction.
- 3. Evaluative Purposes:** To assess the effectiveness of educational programs, policies or innovations.
- 4. Diagnostic Purposes:** To identify problems, needs or attitudes that require intervention, such as learning difficulties or teacher professional development needs.
- 5. Predictive Purposes:** To forecast trends or outcomes based on existing data patterns, such as predicting dropout rates or career preferences.

### **Types of Questionnaires:**

Questionnaires can be classified based on their format, method of administration or response type.

## **A. Based on Response Format**

**1. Structured (Closed-Ended) Questionnaires:** These contain predetermined response options, enabling quantitative analysis. Examples include multiple-choice items, Likert-type scales, ranking scales and checklists. Closed-ended questions facilitate coding, scoring and statistical treatment but may restrict the depth of response.

**Example:** *“The use of technology enhances student learning outcomes.”*

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

**2. Unstructured (Open-Ended) Questionnaires:** Respondents are free to answer in their own words, allowing for richer qualitative insights. These are particularly valuable for exploratory or phenomenological studies but pose challenges in coding and interpretation.

**Example:** *“What challenges do you face in integrating ICT into your teaching practices?”*

**3. Mixed or Semi-Structured Questionnaires:** Combine both types, providing both quantitative precision and qualitative depth. This approach is increasingly common in mixed-methods research designs.

## **B. Based on Method of Administration**

**1. Self-Administered Questionnaires:** Distributed personally, via mail, or electronically, to be completed independently by respondents.

**2. Interviewer-Administered Questionnaires:** The researcher reads out the questions and records responses, often used when literacy or comprehension may be a barrier.

**3. Online or Electronic Questionnaires:** Conducted using web-based platforms such as Google Forms or SurveyMonkey, which enhance accessibility and data accuracy.

## **C. Based on Measurement Scales**

Questionnaires frequently employ psychometric scaling to quantify attitudes and opinions:

- **Nominal Scales:** Classify data into categories (e.g., gender, qualification).
- **Ordinal Scales:** Rank responses without equal intervals (e.g., satisfaction ranking).

- **Interval Scales:** Employ equal intervals without absolute zero (e.g., Likert scales).
- **Ratio Scales:** Have absolute zero, though less common in attitudinal measures.

### **Steps in Constructing a Questionnaire:**

The process of constructing a scientifically valid and reliable questionnaire involves meticulous planning, piloting and validation. According to Tuckman (1999) and Creswell (2014), the major steps include the following:

#### **1. Defining the Objectives**

The first step is to clearly specify the research purpose and the variables to be measured. The content of the questionnaire must align precisely with the research questions or hypotheses.

#### **2. Identifying the Target Population**

Understanding the characteristics of the intended respondents for example- age, education, linguistic background etc. helps in phrasing questions appropriately and choosing suitable modes of administration.

#### **3. Drafting the Questions**

Questions should be worded simply and precisely, avoiding ambiguity, double-barrelled phrasing, and bias. The researcher should prefer positive wording and short sentences.

#### **4. Determining Question Type and Response Format**

Depending on the nature of data required, the researcher decides between open or closed forms, or combines both. Attitudinal studies often use Likert-type scales, while factual inquiries may use checklists.

#### **5. Organizing and Sequencing Items**

The arrangement of questions should follow a logical and psychological flow. Begin with simple, non-threatening items to build rapport, move toward specific and complex items, and end with demographic information.

#### **6. Pre-testing and Pilot Study**

A pilot test is conducted on a small sample representing the target population. This helps identify ambiguous wording, irrelevant items, and respondent difficulties. Statistical analyses like- Cronbach's alpha can be performed to check reliability.

## **7. Establishing Reliability and Validity**

Reliability refers to the consistency of the instrument. Common measures include test–retest reliability, split-half reliability, and internal consistency like-Cronbach’s alpha. Validity ensures that the instrument actually measures what it purports to measure. Major types include content validity, construct validity, and criterion-related validity.

## **8. Administering the Questionnaire**

The researcher should provide clear instructions, ensure anonymity, and establish rapport. Informed consent must be obtained in accordance with ethical research practices.

## **9. Scoring and Data Analysis**

Responses are coded numerically for statistical analysis. For open-ended questions, qualitative content analysis or thematic analysis may be used.

### **Merits of Using Questionnaires:**

1. Questionnaires are economical and efficient as they can collect data from a large number of respondents in a short time at low cost.
2. They ensure standardization by presenting the same set of questions to all participants, enabling comparability of responses.
3. They provide anonymity, which encourages respondents to express honest opinions, particularly on sensitive issues.
4. Questionnaire responses are easily quantifiable, allowing for advanced statistical analysis.
5. They offer geographical flexibility, as online and postal formats can reach widely dispersed populations.
6. Questionnaires involve minimal researcher interference, reducing the influence of the researcher on respondents’ answers.

### **Limitations of Questionnaires:**

1. Questionnaire responses may be superficial and lack depth, especially when exploring complex psychological constructs.

2. Response bias such as social desirability, acquiescence, or non-response can distort the accuracy of findings.
3. Misinterpretation may occur if questions are ambiguously worded or too complex.
4. Low response rates in mail or online surveys can threaten the representativeness of the sample.
5. Questionnaires lack contextual insight, as they capture opinions rather than actual behaviour or situational dynamics.
6. Fixed response categories in closed-ended questions may restrict respondents from expressing nuanced views.

To mitigate these challenges, researchers should combine questionnaires with qualitative methods such as interviews or classroom observations etc. The researcher must ensure informed consent, voluntary participation, anonymity and confidentiality. Sensitive questions should be carefully worded to avoid discomfort or harm. The questionnaire, as a research tool, occupies a unique position at the intersection of quantitative precision and human subjectivity. When carefully designed and ethically administered, it serves as a powerful means of capturing the collective voice of educational communities.

**Check Your Progress:**

Q.3. What are the process of using observation Schedule in Research?

Q.4. State few objectives of using questionnaire in Research.

### **5.6 Interview Schedule as tool of Educational Research**

The interview schedule is another key research tool that refers to a systematically prepared framework of questions or topics designed to guide the interviewer during the process of conducting interviews in a structured, semi-structured or unstructured manner. It serves as an organized plan that ensures consistency, relevance and completeness in data collection while still allowing flexibility for probing and follow-up questions. In educational research, the interview schedule bridges the gap between rigid standardized instruments and free, informal

conversations by providing direction to the interaction without restricting the natural flow of dialogue.

Conceptually, an interview schedule translates the objectives of a research study into carefully sequenced questions that elicit meaningful verbal responses from respondents. It operationalizes abstract educational constructs such as beliefs about teaching, learning experiences, professional identity, motivation or policy perceptions into interviewable prompts. Unlike questionnaires, the interview schedule is administered orally, enabling the researcher to clarify questions, probe deeper into responses and adapt the order or wording of questions according to the context and the respondent's background. Best and Kahn (2016) observe, "An interview schedule acts as a blueprint for obtaining comparable data from diverse respondents while allowing flexibility for elaboration and clarification" (p. 225).

The meaning of the interview schedule also lies in its role in enhancing methodological rigor. By ensuring that all respondents are asked comparable questions, it promotes uniformity and reliability across interviews, while its open-ended nature preserves depth and richness of data. Furthermore, the interview schedule supports ethical and effective communication by helping the interviewer maintain focus, avoid leading questions and respect respondents' comfort and perspectives. Thus, the interview schedule is not merely a list of questions but a carefully constructed research instrument that facilitates systematic, in-depth and context-sensitive data collection, making it an indispensable tool in educational research, particularly within qualitative and mixed-methods approaches. Kerlinger (1986) defines it, an interview is "a face-to-face interaction in which verbal questions are posed to elicit responses relevant to the research problem." Again, Cohen, Manion and Morrison (2018) describe interviews as "a negotiated text, co-constructed between interviewer and interviewee," emphasizing their interpretive and dialogical character (p. 509).

### **Objectives of Interviews in Educational Research:**

Interviews serve several key purposes in the domain of educational research:

- 1. Exploratory Purposes:** To generate hypotheses or identify variables for further study.
- 2. Descriptive Purposes:** To obtain detailed information about experiences, processes, or contexts.

**3. Explanatory Purposes:** To understand the underlying reasons, motivations, or interpretations associated with behaviours or decisions.

**4. Evaluative Purposes:** To assess attitudes toward educational programs, policies, or reforms.

**5. Complementary Purposes:** To enrich quantitative data derived from surveys or observations by providing qualitative depth.

For instance, while a questionnaire might reveal that teachers have mixed attitudes toward continuous assessment, interviews can uncover why such attitudes exist—perhaps due to workload, lack of training, or administrative pressure.

### **Types of Interviews in Educational Research:**

Interviews in educational research can be classified into the following types for easy understanding:

#### **A. Based on Structure:**

##### **1. Structured Interviews**

These interviews follow a fixed set of predetermined questions asked in the same order for all respondents. They are highly standardized and are mainly used in quantitative research where uniformity and comparability of responses are required.

##### **2. Semi-Structured Interviews**

In this type, the interviewer uses a prepared guide of key questions but has the freedom to probe further and explore new ideas that emerge during the interview. This type is commonly used in mixed-methods and exploratory studies.

##### **3. Unstructured Interviews**

These interviews are informal and conversational, with no fixed set of questions. The interviewer uses broad topics to guide the discussion, allowing respondents to express their views freely. They are mainly used in qualitative research.

#### **B. Based on Mode of Interaction:**

##### **1. Individual Interviews**

Conducted between one interviewer and one respondent, this is the most common type in educational research.

## **2. Group or Focus Group Interviews**

Conducted with a small group of participants to collect collective views, opinions and group interactions on a topic.

## **3. Panel Interviews**

Involves multiple interviewers questioning a single respondent, often used in evaluation or selection-related studies.

## **C. Based on Communication Channel**

### **1. Face-to-Face Interviews**

Traditional interviews conducted in person, allowing observation of facial expressions and body language.

### **2. Telephone or Video Interviews**

Conducted using telephone or video conferencing tools, useful when in-person interviews are not possible.

### **3. Online Interviews**

Conducted through digital platforms such as Zoom, Google Meet or Microsoft Teams, making remote data collection possible and convenient.

These types of interviews allow researchers to choose the most suitable method based on research objectives, resources and context.

## **Construction of an interview schedule**

The construction of an interview schedule involves several sequential stages:

### **1. Defining the Objectives of the Interview**

The first step is to clearly identify what information is to be obtained and why. The schedule should align with the overall research questions and hypotheses. For instance, in a study on inclusive education, the objective may be to explore teachers' perceptions of inclusion, challenges faced and support systems available.

## 2. Formulating Questions

Questions should be precise, clear, and free from bias or leading wording. They may be of different types:

- **Factual Questions:** Used to obtain demographic or background information.

Example: “What is your highest academic qualification?”

- **Opinion Questions:** Designed to elicit personal views, beliefs, or attitudes.

Example: “How do you perceive the impact of continuous assessment on student learning?”

- **Behavioral Questions:** Intended to gather information about actual practices or actions.

Example: “What strategies do you use to engage students during online classes?”

- **Probing Questions:** Used to obtain deeper explanations or clarification of responses.

Example: “Could you describe the reasons behind this approach in more detail?”

Good interview schedules typically include both closed and open-ended questions, starting with simple, factual ones to build comfort and rapport before moving into more complex or sensitive issues.

## 3. Sequencing the Questions

Questions should flow logically and psychologically, beginning with general topics and gradually narrowing to specific issues. This sequencing fosters natural conversation and reduces respondent fatigue or defensiveness.

## 4. Piloting the Schedule

A pilot test with a small subset of the target population helps identify ambiguous wording, inappropriate sequencing, or practical difficulties. Feedback from the pilot informs refinement before the main data collection.

## 5. Training the Interviewer

Since interviews are interactive, the researcher’s skills profoundly affect data quality. Training should include developing neutral questioning techniques, maintaining rapport, managing time and minimizing bias.

## **6. Conducting the Interview**

The interviewer must create a comfortable environment, explain the purpose of the research, assure confidentiality, and obtain informed consent. Non-verbal communication such as nodding, maintaining eye contact and showing empathy is crucial for establishing trust.

## **7. Recording Responses**

Responses may be recorded through note-taking, audio recording or video recording with permission. Accurate documentation ensures that nuances are captured for subsequent transcription and analysis.

## **8. Data Transcription and Analysis**

Data from interviews are transcribed verbatim and then subjected to content analysis or thematic coding to identify recurrent patterns, categories, and meanings. In mixed-methods studies, qualitative findings from interviews may be integrated with quantitative survey data for triangulation.

### **Merits of Interviews Schedule:**

1. Interviews provide in-depth and rich data by allowing respondents to elaborate on their thoughts and feelings.
2. They offer flexibility, enabling the interviewer to clarify questions and probe further when needed.
3. Personal interaction often leads to higher response rates compared to mailed questionnaires.
4. Non-verbal cues such as body language, tone and facial expressions can be observed for additional insight.
5. Interviews capture responses within their social, institutional, and cultural contexts.
6. They complement other methods, providing qualitative depth and validating findings from questionnaires or observations.

### **Limitations of Interviews Schedule:**

1. Interviewer bias may influence responses through tone, wording, or reactions.

2. Respondents may provide socially desirable answers or withhold sensitive information.
3. Conducting and transcribing interviews is time-consuming and costly.
4. Findings from small samples may have limited generalizability.
5. The personal nature of interviews raises ethical concerns regarding privacy and confidentiality.
6. The effectiveness of interviews depends heavily on the interviewer's skill and competence.

To mitigate these weaknesses, researchers should use standardized protocols, triangulate data sources and maintain reflexive journals documenting their own influence on the research process. The interview schedule is a dynamic and human-centered research tool that bridges the empirical and interpretive dimensions of educational inquiry. Unlike purely quantitative instruments, it acknowledges the voice, agency and subjectivity of participants, making it indispensable for studies that aim to understand meaning, experience, and perspective.

### **5.7 Inquiry Forms as tool of Educational Research**

The inquiry form, also referred to as an “information form” or “schedule of inquiry,” is a structured or semi-structured research instrument designed to collect factual, attitudinal or diagnostic information directly from respondents in a systematic and organized manner. It integrates features of both questionnaires and interview schedules, making it a versatile tool for educational research. Inquiry forms are especially useful when factual or documentary data are required such as personal, academic, or institutional records or when a standardized yet flexible approach to data collection is needed.

According to **Good (1972)**, an inquiry form is “a formalized instrument containing items that elicit factual information or opinions, generally completed by an investigator through personal contact with the respondent.” This highlights its hybrid nature: it is less rigid than a questionnaire but more structured than an open-ended interview. Inquiry forms can accommodate both quantitative responses and brief qualitative explanations, allowing researchers to capture precise information along with contextual insights.

In educational research, inquiry forms are widely employed in institutional surveys, case studies, guidance and counselling investigations, and evaluative studies where accurate factual data are essential. For example, a study examining the socio-economic background of students and its relationship to academic achievement might use inquiry forms administered to parents or school administrators to collect reliable demographic and institutional data efficiently.

Inquiry forms have wide-ranging applications in educational research, serving as a systematic tool for collecting factual and attitudinal information across various domains. They are commonly used in school surveys to gather data on facilities, teacher qualifications, student enrolment and other institutional characteristics. In the area of guidance and counselling, inquiry forms help collect information about students' backgrounds, interests and aptitudes, supporting career guidance and personal development programs. They are also employed in educational evaluation to document institutional practices, gather student feedback and assess the effectiveness of programs or interventions. In sociological studies, inquiry forms facilitate the recording of demographic and socio-economic characteristics of student populations, aiding in research on equity, inclusion and social factors affecting education. Additionally, they are valuable in administrative research for compiling data that inform policy formulation, school improvement and resource planning. For instance, in a study on parental involvement in schooling, an inquiry form might be used to collect standardized information on parents' educational levels, occupations, frequency of communication with teachers and perceptions of school support, all within a single structured instrument.

### **Nature and Characteristics:**

Inquiry forms possess several key features that make them a valuable and versatile tool in educational research:

- 1. Dual Purpose:** They are designed to collect both factual and attitudinal information, effectively bridging the gap between objective and subjective inquiry.
- 2. Structured Yet Flexible:** While the items are generally standardized, the researcher has the flexibility to probe further or seek clarification when necessary.
- 3. Investigator-Administered:** Inquiry forms are often completed by the researcher during personal visits, ensuring accuracy, completeness and reliability of the collected data.

**4. Documentary Orientation:** They frequently include sections for recording official or institutional data such as attendance, academic performance, or family background.

**5. Economical and Time-Efficient:** Inquiry forms are easier to administer than interviews and more adaptable than questionnaires, making them suitable for a variety of research contexts and large samples.

**6. Standardization:** The items are presented in a consistent format for all respondents, promoting uniformity and facilitating comparison of responses across individuals or groups.

**7. Ease of Analysis:** Data collected through inquiry forms can be systematically organized, tabulated, and analyzed quantitatively or qualitatively depending on research objectives.

**8. Versatility:** They can be used in multiple research settings, including schools, colleges, and other educational institutions and are applicable to students, teachers, parents, and administrators alike.

**9. Clarity and Simplicity:** Questions or items are generally clear and concise, making them easy for respondents to understand and for researchers to record.

**10. Supplementary Probing Capability:** Though structured, inquiry forms allow the researcher to add brief qualitative notes or observations, providing additional context to the data collected.

These features collectively make inquiry forms a practical, reliable and efficient tool for gathering comprehensive data in educational research.

### **Steps in Constructing an Inquiry Form:**

The process of employing an inquiry form in educational research typically involves the following stages:

#### **1. Defining the Purpose and Scope**

The researcher begins by clearly identifying the type of information to be collected, whether personal, academic, attitudinal or administrative, and determining the objectives and boundaries of the inquiry.

## **2. Designing the Format**

The form should have a well-organized layout with distinct sections for different categories of data, such as demographic details, behavioural observations and opinion items. Instructions should be simple, concise and unambiguous to ensure clarity for respondents.

## **3. Formulating Questions and Items**

Questions should be clearly worded, objective and relevant to the research objectives. Both closed-ended and open-ended questions can be used: closed questions for accurate factual data and open-ended questions to capture attitudes, perceptions or explanations.

## **4. Piloting the Inquiry Form**

Conducting a pilot study helps identify potential issues such as unclear wording, inappropriate sequencing, or redundancy. Feedback from the pilot ensures that the form is refined and suitable for final administration.

## **5. Administering the Form**

Inquiry forms can be administered in two main ways:

- **Investigator-Administered (Interview Type):** The researcher fills out the form through direct contact, ensuring completeness and accuracy.
- **Self-Administered (Questionnaire Type):** Respondents complete the form themselves, which may promote anonymity and candid responses.

## **5. Checking and Coding Responses**

After data collection, responses are reviewed for completeness and consistency. Factual or quantitative data are coded numerically for analysis, while open-ended or qualitative responses are categorized thematically to identify patterns and insights.

This systematic process ensures that inquiry forms produce reliable, valid, and analyzable data for educational research.

### **Merits of Inquiry Forms:**

1. Inquiry forms are versatile, combining features of questionnaires and interviews to collect both factual and interpretive data.

2. They ensure accuracy, as researcher supervision during completion minimizes omissions and misinterpretation.
3. They are adaptable, suitable for a wide range of respondents including teachers, students, parents and administrators.
4. They are economical, requiring less time and training than interviews while providing richer data than simple questionnaires.
5. They are comprehensive, allowing collection of biographical, socio-economic, academic and attitudinal information in a single instrument.

### **Limitations of Inquiry Forms:**

1. When completed by the investigator, there is potential for researcher bias in interpretation or recording of responses.
2. They offer limited anonymity, which may make respondents hesitant to disclose sensitive information.
3. Their depth is restricted compared to in-depth interviews, providing less detailed insights.
4. The combination of qualitative and quantitative responses makes data coding and analysis more complex.

All these tools of educational research, discussed above including observation schedules, questionnaires, interview schedules and inquiry forms constitute the operational backbone of empirical investigation in education. Each tool transforms abstract educational questions into observable and measurable data, facilitating the systematic understanding of teaching, learning, and institutional processes. Yet, these tools are not mere mechanical devices; they embody philosophical orientations, methodological assumptions and ethical commitments.

### **5.8 Summing Up**

As we have come to the end of this unit, it can be summarized as:

- Tools of educational research are systematic instruments used to collect, measure and analyze data to study educational phenomena accurately and scientifically.

- Research tools ensure reliability, validity, objectivity and efficiency in data collection while facilitating evidence-based educational decisions and policy-making.
- **Observation Schedule:** An observation schedule systematically records actual behaviours, classroom interactions and educational processes, providing direct, context-sensitive, and non-verbal data.
- **Questionnaire:** A questionnaire is a structured instrument designed to collect factual, attitudinal or opinion-based data from large populations efficiently and uniformly.
- **Interview Schedule:** An interview schedule is a guided set of questions used to explore in-depth perceptions, attitudes, beliefs and experiences through direct verbal interaction.
- **Inquiry Forms:** Inquiry forms are structured or semi-structured tools combining features of questionnaires and interviews to collect factual, attitudinal or administrative data systematically and comprehensively.

## 5.9 References and Suggested Readings

- Basavayya, D., & Venkataiah, N. (2016). *Essence of educational research methodology*. Neel Kamal Publication Pvt. Ltd.
- Best, J. W., & Kahn, J. V. (2016). *Research in education* (10th ed.). Pearson Education.
- Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education* (8th ed.). Routledge.
- Creswell, J. W. (2014). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed.). Pearson.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- Daroga, S., & Chaudhary, F. S. (2002). *Theory & analysis of sample survey designs*. New Age International Publishers Ltd.
- Good, C. V. (1972). *Dictionary of education* (3rd ed.). McGraw-Hill.

- Kerlinger, F. N. (1986). *Foundations of behavioral research* (3rd ed.). Holt, Rinehart & Winston.
- Kothari, C. R., & Garg, G. (2019). *Research methodology: Methods and techniques* (4th ed.). New Age International Publishers.
- Koul, L. (2019). *Methodology of educational research* (5th ed.). Vikas Publishing House Pvt. Ltd.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Sage Publications.
- Malhotra, N. K., & Dash, S. (2011). *Marketing research: An applied orientation* (6th ed.). Pearson Education.
- Savitha, G., Prasad, P., Vijyata, A., Sharma, A., & Kandikota, A. (2024). *A textbook on research methodology*. KD Publications.
- Tuckman, B. W. (1999). *Conducting educational research* (5th ed.). Harcourt Brace College Publishers.

### 5.10 Model Questions

1. What is meant by tools of educational research?
2. Name four commonly used tools of educational research.
3. Explain the significance of using research tools in educational research.
4. What are the key characteristics of an observation schedule as a research tool?
5. Differentiate between structured and unstructured interviews in educational research.
6. Discuss the applications of questionnaires in educational research with examples.
7. Explain the stages involved in designing and administering an inquiry form.
8. Compare and contrast the advantages and limitations of interviews and inquiry forms in educational research.
9. How do observation schedules, questionnaires, interviews, and inquiry forms complement each other in a mixed-methods educational study?

## 5.11 Answer to Check Your Progress/Possible Answers to SAQ

**Answer to Q.1:** Tools of Educational Research are the essential instruments and techniques through which data are systematically collected, organized and interpreted in the study of educational problems. They serve as the practical means by which researchers obtain factual information, opinions, attitudes, experiences and behavioural patterns related to teaching, learning and educational administration.

**Answer to Q.2:** The few key aspects of Tools of Educational Research include the following:

### 1. Objectivity

Research tools should collect data in an unbiased and neutral manner. Objectivity ensures that personal opinions or prejudices of the researcher do not influence the data, leading to accurate and trustworthy findings.

### 2. Validity

Validity refers to the extent to which a tool measures what it is intended to measure. A valid research tool accurately represents the educational variable under study, such as achievement, attitude or interest.

### 3. Reliability

Reliability denotes the consistency and stability of a research tool. A reliable tool produces similar results when administered under similar conditions, ensuring dependability of the data.

**Answer to Q.3:** The development of an effective observation schedule involves several key steps:

1. Defining the Purpose
2. Operationalizing Variables
3. Developing Categories
4. Designing the Recording Format
5. Pilot Testing
6. Training Observers

## 7. Establishing Reliability and Validity

**Answer to Q.4:** In educational research, questionnaires serve following key purposes:

1. Descriptive Purposes
2. Explanatory or Co relational Purposes
3. Evaluative Purpose
4. Diagnostic Purposes

**Answer to SAQ 1:** The significance of tools of educational research lies in their vital role in ensuring the systematic, scientific and effective study of educational phenomena. They form the foundation upon which the entire research process is built and contribute directly to the quality and credibility of research outcomes. Firstly, research tools enable the systematic collection of data. They provide structured methods for gathering information related to learners, teachers, institutions, and educational processes, ensuring that data are collected in an organized and purposeful manner. Secondly, tools of educational research help in measuring abstract educational variables such as intelligence, achievement, attitude, interest, motivation, and behaviour. By converting these intangible concepts into measurable forms, research tools make scientific analysis possible. Thirdly, they enhance the objectivity and accuracy of research. Standardized tools reduce personal bias and subjective judgments, thereby increasing the trustworthiness and precision of the findings.

---x---

**BLOCK: 4**

**QUALITATIVE AND QUANTITATIVE DATA ANALYSIS**

**Unit 1: Qualitative Research - Meaning, Concept, Characteristics**

**Unit 2: Quantitative Research - Meaning, Concept, Characteristics**

**Unit 3: Differences between Qualitative and Quantitative Research**

**Unit 4: Qualitative Data Analysis – Organisation of qualitative data, Analysis and Interpretation of qualitative data**

**Unit 5: Quantitative Data Analysis – Organization of Quantitative Data, Analysis and Interpretation of Quantitative Data**

## UNIT- 1

### QUALITATIVE RESEARCH - MEANING, CONCEPT, CHARACTERISTICS

#### **Unit Structure:**

- 1.1 Introduction
- 1.2 Objectives
- 1.3 Meaning of Qualitative Research
- 1.4 Concept of Qualitative Research
  - 1.4.1 Emergence in Social Sciences
- 1.5 Characteristics of Qualitative Research
- 1.6 Types of Qualitative Research
  - 1.6.1 Stages or Steps involved in Qualitative research
- 1.7 Summing Up
- 1.8 Samples Questions
- 1.9 References and Suggested Readings
- 1.10 Answer to Check Your Progress

#### **1.1 Introduction**

Dear Learners, Research is a systematic and organized process of finding answers to questions or solving problems through careful study and investigation. It is a way of discovering new knowledge, verifying facts, and developing understanding in different fields such as education, science, social studies, and health. Research involves collecting information, analyzing it, and drawing conclusions that help improve human life and society. It allows people to explore ideas, test theories, and make informed decisions. Researchers use various methods to gather data, such as surveys, experiments, and observations. Based on the type of data and purpose of the study, research is generally divided into two main types: quantitative and qualitative research. Quantitative research deals with numbers, measurements, and statistics. It focuses on testing hypotheses and establishing cause-and-effect relationships. On the other hand, qualitative research explores ideas, meanings, and experiences in depth. It helps to understand how and why people behave, think, or feel in

certain ways. In this unit, we will discuss the meaning, concept, and characteristics and steps or stages involved in qualitative research.

## 1.2 Objectives

After going through this unit, you will be able to –

- *comprehend* the meaning of Qualitative Research;
- *understand* the concept of Qualitative Research;
- *identify* the characteristics of Qualitative Research;
- *discuss* the types of Qualitative Research;
- *examine* the stages or steps involved in Qualitative research.

## 1.3 Meaning of Qualitative Research

Qualitative research is a type of research that focuses on understanding human behavior, experiences, and social situations in depth. Unlike quantitative research, which deals with numbers, measurements, and statistics, qualitative research aims to explore meanings, emotions, opinions, and motivations behind people's actions. It helps researchers gain a deeper understanding of *why* and *how* something happens, rather than just *what* happens.

In simple words, qualitative research is about studying people in their natural settings and trying to understand their perspectives and feelings. It looks for detailed explanations and insights rather than general facts or figures. This kind of research is especially useful in subjects like education, psychology, sociology, anthropology, and health sciences, where human behaviour and interaction are central topics.

One of the main features of qualitative research is that it uses open-ended questions and flexible methods. The researcher does not start with a fixed idea but allows new ideas and patterns to emerge from the data. The data in qualitative research are mostly in the form of words—such as interviews, observations, written documents, diaries, and recordings—rather than numerical data. This makes it possible to understand complex issues from the participants' own point of view.

For example, if a researcher wants to study how students feel about online learning, they might conduct interviews or group discussions to listen to students' personal experiences. The goal is not to count how many students like or dislike online learning, but to explore *why* they feel that way, what challenges they face, and what improvements they suggest.

There are several common methods used in qualitative research, such as interviews, focus groups, case studies, ethnography, and content analysis.

- Interviews help gather in-depth information from individuals.
- Focus groups involve group discussions that bring out shared opinions.
- Case studies explore a single person, group, or event in great detail.
- Ethnography means studying people's culture or daily life by observing them closely.
- Content analysis is used to study written or recorded materials to identify themes or patterns.

Another important feature of qualitative research is that it is *subjective*, meaning that it involves the researcher's interpretation. The researcher becomes part of the study by interacting with the participants. However, researchers try to remain fair and open-minded while analyzing the data. The goal is to describe and interpret reality as it is experienced by the people being studied.

Qualitative research is also *flexible* and *naturalistic*. It takes place in real-life settings, not in controlled laboratories. The research design can change as the study progresses if new ideas or directions appear. This flexibility allows the researcher to understand the topic more completely. Qualitative research is a powerful way to understand human experiences and social realities. It does not aim to measure or count things, but to explain meanings, emotions, and relationships. Through interviews, observations, and detailed analysis, it gives a deep and rich picture of people's lives, helping researchers and society understand the human side of every issue.

#### **STOP TO CONSIDER**

- A type of research meant for qualitative description of the behaviour and events observed in their natural setting by using qualitative data (mostly in the form of narratives) and specialized techniques for the analysis and interpretation of the collected qualitative data.

### CHECK YOUR PROGRESS

1. What is the main purpose of qualitative research?

.....

.....

.....

.....

#### 1.4 Concept of Qualitative Research

The concept of qualitative research is based on understanding human experiences, behaviours, and interactions in their natural settings. It is a form of research that explores how people interpret and give meaning to their lives and the world around them. Instead of measuring things with numbers, qualitative research focuses on collecting rich, detailed information that helps reveal deep insights into human thinking and social reality. The concept of qualitative research developed gradually over many years through the contributions of philosophers, sociologists, psychologists, anthropologists, and educational thinkers.

This approach views reality as something that is constructed by people, not something fixed or absolute. People have different ways of understanding the same situation, and qualitative research tries to capture those multiple perspectives. It looks at the *depth* of experiences rather than their *frequency*, which makes it especially useful for studying social, emotional, and cultural aspects of life.

The foundation of qualitative research can be traced back to philosophical traditions that emphasized understanding and interpretation rather than measurement. Two important philosophical movements influenced its origin: phenomenology and hermeneutics.

1. **Phenomenology** – Developed by the German philosopher Edmund Husserl in the early 20th century, phenomenology focused on studying how people experience and interpret the world. It aimed to understand human experiences from the *first-person point of view*. This became a central idea in qualitative research — the goal of studying things as people experience them in real life, without reducing them to numbers.

2. **Hermeneutics** – This tradition originated in the interpretation of texts, especially in theology and literature. Later, philosophers like Wilhelm Dilthey and Hans-Georg **Gadamer** expanded hermeneutics to include understanding human actions, social life, and culture. Hermeneutics introduced the idea that researchers should interpret meanings within their context — an idea that became fundamental in qualitative research.

These philosophical roots helped shape the qualitative way of thinking: that human reality is full of meanings, symbols, and emotions that cannot be captured through statistics alone.

### **1.4.1 Emergence in the Social Sciences**

The **social sciences** — especially sociology and anthropology — played a key role in the development of qualitative research in the late 19th and early 20th centuries. Social scientists began to realize that human behavior could not be studied in the same way as natural phenomena. People act according to meanings, beliefs, and emotions, which cannot be measured through experiments or surveys alone.

#### **1. Anthropology and Ethnography**

Anthropology was one of the first fields to use qualitative methods. Early anthropologists such as Bronisław Malinowski and Franz Boas in the early 1900s used observation and participation to study different cultures. They lived with people, observed their daily activities, and tried to understand their customs and traditions from the inside. This method became known as ethnography, a major form of qualitative research.

Ethnographic studies helped researchers see that culture and social behavior could only be truly understood by spending time in the natural environment of the people being studied. This idea continues to guide qualitative research today.

#### **2. Sociology and the Chicago School**

The Chicago School of Sociology (1910s–1930s) in the United States was another major influence. Sociologists such as Robert Park, Ernest Burgess, and Herbert Blumer began to use interviews, observations, and case studies to study urban life in Chicago.

They wanted to understand how people interacted, adapted, and formed communities in rapidly growing cities. This period gave rise to many classic qualitative research techniques, such as participant observation and in-depth interviewing. The Chicago School showed that social behaviour could best be understood by directly studying people's lives and interactions.

In qualitative research, the researcher plays an active role. The researcher interacts with participants, listens to their stories, observes their actions, and interprets their words. This creates a close relationship between the researcher and the participants, making the research process more personal and natural. The goal is not to prove a theory but to understand how and why people behave or think in a certain way.

Qualitative research is flexible, open-ended, and often changes as the study progresses. The researcher can adjust questions or methods depending on what is being discovered. This flexibility helps the researcher explore the topic deeply and uncover hidden meanings or patterns that might not appear in structured, numerical studies.

At the heart of qualitative research is the study of human experience. It tries to explore feelings, emotions, beliefs, motivations, and relationships. It values the voice of participants and gives importance to their real-life situations. For instance, if a researcher wants to study how children feel about online learning, they might talk to the children, observe their behaviour, and understand their emotions through their expressions and words.

Such research does not aim to generalize findings to everyone but to understand each situation in detail. It appreciates the uniqueness of every human experience and presents it as it is, with honesty and depth.

### **1.5 Characteristics of Qualitative Research**

Qualitative research has several unique characteristics that make it different from other types of research. It focuses on understanding human experiences, thoughts, and behaviours in depth rather than measuring them with numbers. Following are the characteristics of qualitative research:

- 1. Focus on Meaning and Understanding-** Qualitative research tries to understand the meaning behind people's actions, experiences, and feelings. It explores *why* and *how*

something happens rather than just *what* happens. For example, it studies how students *feel* about online learning, not just how many students attend it.

2. **Natural Setting** - This research is done in real-life environments, such as homes, schools, workplaces, or communities. Researchers study people in their natural surroundings to see their genuine behavior and reactions, rather than in a lab or artificial situation.
3. **Use of Non-Numerical Data** - The data collected in qualitative research are mostly in words, pictures, or observations, not numbers. It includes interviews, notes, diaries, photographs, or recorded conversations that show people's experiences in detail.
4. **Open-Ended and Flexible** - Qualitative research is not limited by strict rules or fixed questions. Researchers can change their questions or direction as they discover new information. This flexibility helps them explore the topic deeply and find unexpected results.
5. **Participant's Perspective** - This research values the participants' point of view. It focuses on how people see and experience the world around them. The goal is to understand the situation through the eyes of the participants, not through the researcher's personal opinions.
6. **Descriptive and Detailed** - Qualitative research gives a rich and detailed description of the topic. Instead of using short answers or numbers, it explains events, situations, and emotions in depth. The findings are often presented in the form of stories or themes that give a complete picture.
7. **Inductive Approach** - In qualitative research, the researcher does not start with a fixed theory. Instead, they collect data first and then look for patterns, ideas, or themes that appear. This process helps to build new theories or concepts from the ground up.
8. **Small and Purposeful Sample**

Qualitative research usually studies a small group of people who are directly related to the topic. The goal is not to represent a whole population but to get deep insights from selected participants who can provide valuable information.

**9. Data analysis** – Data analysis in qualitative research emphasizes inductive methods comparable to putting together the parts of a puzzle. Consequently, data in qualitative research is analyzed through the reading and review of data (observation, interview transcripts) to detect themes and patterns that emerge.

**10. Qualitative research as an interpretive research** – Qualitative research as emphasized by Erickson (1985) is also referred to as interpretive research because in this type of research, the researcher alone is supposed to make sense of the data through his own elucidation and interpretation of the information collected from the participants in their natural surroundings and cultural set-up.

#### **STOP TO CONSIDER**

- In qualitative research, the researcher does not start with a fixed theory. Instead, they collect data first and then look for patterns, ideas, or themes that appear. This process helps to build new theories or concepts from the ground up.
- Qualitative research usually studies a small group of people who are directly related to the topic. The goal is not to represent a whole population but to get deep insights from selected participants who can provide valuable information.

#### **CHECK YOUR PROGRESS**

2. Qualitative research focuses on understanding human experiences. ( Write True/False)
3. Qualitative research uses numerical data. — (Write True/False)
4. Interviews are a common tool in qualitative research. — (Write True/False)
5. Qualitative research always requires large samples. — (Write True/False)

### **1.6 Types of Qualitative Research**

- 1. Case Study** - A **case study** is a type of qualitative research that focuses on one particular person, group, event, or situation. It helps researchers

understand a specific case in detail. The researcher collects information from various sources such as interviews, observations, documents, and reports. For example, a researcher might study how a particular school improved its teaching methods or how one family adapted to living in a new culture. The main aim is to get a deep understanding of the case, not to make general conclusions for everyone. Case studies are useful because they provide rich, detailed, and real-life information about a single example.

2. **Ethnography**- Ethnography is a method used to study the culture, lifestyle, and social interactions of a group of people. In this type, the researcher usually spends a long time living with the group to observe their daily activities, beliefs, and customs. This helps the researcher understand how people behave in their natural environment. For instance, an ethnographer may live in a rural village to study how the community celebrates festivals or makes decisions. Ethnographic research gives a clear picture of how people live and think within their own social and cultural settings.
3. **Phenomenology** - Phenomenology focuses on studying people's personal experiences and emotions. The researcher tries to understand how people perceive and feel about certain situations in their lives. Instead of studying facts or numbers, phenomenology is concerned with meanings and feelings. For example, a researcher might study the experiences of patients who have recovered from a serious illness to understand how they view life afterward. This type of research helps in understanding human emotions, thoughts, and the meaning people attach to their experiences.
4. **Grounded Theory** - **Grounded theory** aims to develop a new theory that is "grounded" in real data collected from people. The researcher starts by collecting data through interviews, observations, or discussions and then analyzes it to find patterns or themes. Based on these patterns, the researcher forms a theory that explains a certain behavior or process. For example, a researcher may develop a theory about why students drop out of school by talking to many students and studying their experiences. Grounded theory is important because it builds new knowledge directly from real-life evidence rather than relying on existing ideas.

- 5. Narrative Research - Narrative research** focuses on people's stories and experiences. It involves collecting and analyzing personal stories to understand how individuals make sense of their lives. Researchers often use interviews or written life stories as data. For example, studying the life story of a teacher who worked in rural schools for many years can reveal valuable insights about education and dedication. Narrative research values personal voices and experiences, helping to understand how individuals interpret the events of their lives.

**STOP TO CONSIDER**

- Case study, Ethnography, Phenomenology, Grounded theory, Narrative research are the types of qualitative research

### **1.6.1 Steps or Stages of Qualitative Research**

#### **1. Identifying the Research Problem**

The first step is to choose a topic or problem that needs to be studied. The researcher looks for an issue that requires a deep understanding of people's experiences, feelings, or behaviours. The problem should be meaningful and related to real-life situations.

#### **2. Reviewing Related Literature**

The researcher studies previous research, books, and articles related to the topic. This helps to understand what has already been done and what gaps still exist. It also helps in shaping the direction of the new study.

#### **3. Formulating Research Questions or Objectives**

Instead of forming hypotheses (as in quantitative research), qualitative research focuses on open-ended questions. These questions aim to explore and understand experiences, meanings, or patterns related to the problem.

#### **4. Selecting the Research Design or Approach**

The researcher chooses a suitable qualitative approach such as case study, ethnography, grounded theory, phenomenology, or narrative research, depending on

the purpose of the study. Each approach has its own way of collecting and analyzing data.

## **5. Sampling or Selection of Participant**

The researcher chooses people, groups, or places that can provide rich and relevant information. The researcher's primary concern is to explore individuals in their natural context and they have little interest in generalizing the findings of the study beyond the participants studied. Therefore, for conducting such studies, the researcher's require smaller but focussed samples comprising the participants who can serve the purpose of the needed data collection for the research study. This is usually done through purposive sampling — selecting those who have direct experience with the topic being studied, instead of adopting the usual random sampling techniques for the selection of participants.

## **6. Collecting Data**

This is one of the most important steps. The researcher gathers information through methods like interviews, observations, focus groups, documents, or field notes. The aim is to collect detailed and descriptive data in natural settings.

## **7. Organizing and Analyzing Data**

Data in qualitative research is analyzed through the reading and review of data generally available in the form of observation notes, interview transcripts and documents. It is generally aimed to seek a proper organization and explanation of the collected data helpful in detecting themes and patterns that may emerge from such analysis.

After collecting data, the researcher reads, organizes, and studies it carefully. Common techniques include coding, categorizing, and identifying themes or patterns. The goal is to find meanings and relationships in the data.

## **8. Interpreting the Findings**

The researcher explains what the data means and how it answers the research questions. The interpretation connects the findings with existing theories, concepts, or real-life situations.

## 9. Reporting the Results

Finally, the researcher writes a detailed report describing the problem, purpose, methods, findings, and interpretations. The report is often written in a narrative style to clearly present participants' voices and experiences.

### STOP TO CONSIDER

The steps or stages of qualitative research includes - Identifying the Research Problem, Reviewing Related Literature, Formulating Research Questions or Objectives, Selecting the Research Design or Approach, Sampling or Selection of Participant, Collecting Data, Organizing and Analyzing Data, Interpreting the Findings and Reporting the Results.

### 1.7 Summing Up

Research is a systematic and purposeful process of exploring, analyzing, and understanding various aspects of life, society, and nature. It helps individuals and communities to discover new facts, verify existing knowledge, and solve practical problems. Through research, people gain deeper insights into issues, develop new theories, and improve existing practices. It is an essential tool for progress in every field, including education, social sciences, medicine, and technology. Research not only creates new knowledge but also refines human understanding by encouraging curiosity, questioning, and critical thinking.

Among the different types of research, qualitative research plays a unique and important role. It focuses on the quality and meaning of human experiences rather than numbers or measurements. Qualitative research aims to understand how people interpret their world, how they make sense of their experiences, and what meanings they attach to social interactions. It is particularly useful in studying emotions, behaviours, cultures, and relationships that cannot be expressed through statistics. This type of research values depth, detail, and context. It gives voice to participants and allows researchers to explore real-life situations in their natural settings.

Qualitative research developed from disciplines like sociology, anthropology, and psychology, where scholars studied people's lives through observation, interviews, and participation. Over time, it has become an essential approach in education, social work, and

health studies. By focusing on people's thoughts and feelings, qualitative research helps in forming a complete picture of human life. It highlights the importance of understanding not just *what* people do, but *why* they do it.

The characteristics of qualitative research make it distinct and valuable. One of its key features is its naturalistic approach—it studies people in their real environments instead of controlled laboratories. It is also interpretive, as the researcher seeks to understand meanings from the participants' points of view. Flexibility is another important characteristic; the research design can change as the study progresses, allowing the researcher to explore new directions based on what is observed. Descriptive data is a core element, as qualitative research expresses findings through words, stories, and observations instead of numbers.

### 1.8 Sample Questions

1. Explain the concept and meaning of qualitative research.
2. Describe the main characteristics of qualitative research.
3. Discuss in detail the various types of qualitative research methods. Give suitable examples of each type.
4. Discuss the major steps or processes involved in conducting qualitative research.
5. Elaborate on the role of the researcher in qualitative research. How does the researcher's personal involvement affect the research process and outcome?

### 1.9 References and Suggested Readings

- Koul, Lokesh, (2021) "Methodology of Educational Research" Vikas Publishing House PVT LTD, New Delhi
- Mangal, S.K., Mangal, Shubhra., (2021), "Research Methodology in Behavioural Sciences", PHI Learning PVT LTD, New Delhi
- Travers, R.M.W. (1969) "An Introduction to Educational Research", Second edition. New York:Macmillan
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.

- Best, J. W., & Kahn, J. V. (2015). *Research in education* (10th ed.). Pearson Education.

### 1.10 Answer to Check Your Progress

#### **Answer to Check Your Progress 1:**

The main purpose of qualitative research is to understand people's thoughts, feelings, experiences, and behaviours in depth. It focuses on *why* people think or act in a certain way rather than counting numbers. Qualitative research tries to explore meanings, ideas, and opinions in a natural setting. It helps the researcher understand real-life situations from the participants' point of view. This type of research is useful for studying social issues, beliefs, and personal experiences. It allows flexibility so new ideas can emerge during the study. Overall, the main aim of qualitative research is to gain a deep and detailed understanding of human behaviour and social phenomena.

**Answer to Check Your Progress 2:** True

**Answer to Check Your Progress 3:** False

**Answer to Check Your Progress 4:** True

**Answer to Check Your Progress 5:** False

---x---

## UNIT- 2

### QUANLITATIVE RESEARCH- MEANING, CONCEPT, CHARACTERISTICS

#### **Unit Structure:**

- 2.1 Introduction
- 2.2 Objectives
- 2.3 Meaning of Quantitative Research
- 2.4 Concept of Quantitative Research
- 2.5 Characteristics of Quantitative Research
- 2.6 Types of Quantitative Research
- 2.7 Summing Up
- 2.8 Sample Questions
- 2.9 References and Suggested Readings
- 2.10 Answer to Check Your Progress

#### **2.1Introduction**

Dear learners, As we have already discussed in your previous unit that, Research is a systematic process of collecting, analyzing, and interpreting information to increase our understanding of a topic or problem. It helps in finding answers to questions, discovering new facts, and solving real-life issues. Research can be of different types depending on its purpose, method, and nature of data. Broadly, it is divided into two main types—qualitative and quantitative research. We have already discussed about qualitative research. Quantitative research is a type of research that deals with numbers and measurable data. It focuses on collecting information that can be counted or expressed in numerical form. The main aim of quantitative research is to find patterns, relationships, and causes among different variables. It uses structured methods such as surveys, questionnaires, and experiments to gather data from a large number of people. The collected data are analyzed using statistical tools and presented in graphs, charts, or tables for easy understanding. Quantitative research is based on objectivity and accuracy. It does not depend on personal opinions or emotions but on evidence and facts. Researchers use it to test hypotheses, make predictions, and draw general conclusions about a population. In this unit, we are going to discuss about the meaning, concept, and characteristics of quantitative research.

## 2.2 Objectives

After going through this unit, you will be able to—

- *comprehend* the meaning of Quantitative Research;
- *explain* the concept of Quantitative Research;
- *discuss* the Characteristics of Quantitative Research;
- *describe* the Types of Quantitative Research.

## 2.3 Meaning of Quantitative Research

Quantitative research is a type of research that deals with numbers, measurements, and statistical data. It focuses on collecting and analyzing information that can be counted or expressed in numerical form. The main aim of quantitative research is to find patterns, test theories, and make predictions based on measurable evidence. This kind of research helps in drawing clear and objective conclusions because the results are based on data rather than personal opinions.

In quantitative research, researchers use tools like surveys, questionnaires, and experiments to collect data. For example, a researcher might conduct a survey to find out how many students prefer online learning over classroom learning. The responses are then converted into numbers, such as percentages or averages, which can be analyzed using mathematical or statistical methods. This helps researchers understand trends and relationships among different variables.

Quantitative research usually begins with a specific hypothesis or question that can be tested. The researcher collects data in a systematic way, often from a large group of people, to ensure the results are reliable and can represent a wider population. It is often used in fields like education, psychology, economics, and health studies where measuring performance, attitudes, or outcomes is important. The results of quantitative research are often presented in charts, graphs, or tables for easy understanding. Because it is based on numerical evidence, this research method is considered more objective and scientific. However, it may not explain the deeper meanings or reasons behind people's actions, which are better studied through qualitative research.

One important feature of quantitative research is that it involves large sample sizes. Collecting data from many people helps researchers ensure that their results are valid and can represent a larger group or population. For instance, if a researcher surveys 1,000 students about their study habits, the results are more reliable than asking only ten students.

One of the main strengths of quantitative research is its objectivity. Because it relies on numbers and measurements, personal bias is minimized, and results can be repeated and verified by other researchers. This makes the findings more trustworthy and suitable for making generalizations. However, one limitation is that it may not capture people's feelings, experiences, or motivations, which qualitative research is better suited for.

This method is widely used in social sciences, education, psychology, economics, business, and health studies. For example, in education, quantitative research helps to measure students' academic performance or the effectiveness of a new teaching method. In healthcare, it helps analyze patient recovery rates or the impact of a specific medicine.

## **2.4 Concept of Quantitative Research**

The concept of quantitative research grew out of the belief that everything in the world could be studied, measured, and analyzed through objective observation and logical reasoning. It was influenced by the scientific revolution that began in Europe during the 17th century, which emphasized experimentation, observation, and the use of evidence to reach conclusions.

One of the earliest influences on quantitative research came from philosophers and scientists such as Galileo Galilei, Isaac Newton, and René Descartes. They believed that truth could be discovered through systematic measurement and mathematical analysis. Their scientific methods focused on precision, experimentation, and objectivity, which later became the foundation for quantitative research methods used in the social sciences and education.

During the 19th century, the use of statistics began to grow. Statistics allowed researchers to analyze data and identify patterns in large groups of people. This period marked a major step in the development of quantitative research. Scholars like Auguste Comte, who introduced the idea of positivism, played an important role in shaping the concept. Positivism is the belief that knowledge should be based on observable facts and scientific evidence rather than opinions or beliefs. According to this view, social reality can be studied in the same way as natural sciences—through measurement, numbers, and objective observation.

In the early 20th century, social scientists began to apply quantitative methods to study human behavior, society, and education. Psychologists like Charles Spearman and Francis Galton developed statistical tools such as correlation and regression, which helped measure relationships between variables. These techniques made research more scientific and reliable. Similarly, in education, researchers began using tests, surveys, and experiments to understand how students learn and perform.

The concept of quantitative research continued to grow stronger with the advancement of technology and computer systems in the mid-20th century. Computers made it easier to collect, process, and analyze large amounts of data. This allowed researchers to make more accurate conclusions and predictions. Today, quantitative research is widely used in almost every field—social sciences, health, business, and education—because it provides measurable and objective results.

The concept of quantitative research is based on objectivity, accuracy, and measurement. It uses structured tools such as questionnaires, surveys, tests, or experiments to collect data. The data collected are usually in the form of numbers that can be presented through tables, charts, and graphs. These numbers help to explain trends or differences among groups. In short, the concept of quantitative research revolves around measurement, numbers, and analysis. It helps researchers understand patterns, make predictions, and support decision-making with evidence. Because it is based on data and statistics, quantitative research provides a clear and logical way to understand various problems and find practical solutions in different fields of study.

#### **STOP TO CONSIDER**

- Quantitative research is a type of research that deals with numbers, measurements, and statistical data.
- Quantitative research usually begins with a specific hypothesis or question that can be tested.
- The concept of quantitative research grew out of the belief that everything in the world could be studied, measured, and analyzed through objective observation and logical reasoning. It was influenced by the scientific revolution that began in Europe during the 17th century, which emphasized experimentation, observation, and the use of evidence to reach conclusions.

## CHECK YOUR PROGRESS

1. What is meant by quantitative research?
2. Why quantitative research is called a scientific method?

### 2.5 Characteristics of Quantitative research

Quantitative research is a scientific and systematic method of study that focuses on collecting and analyzing numerical data. It aims to understand phenomena by measuring variables and examining relationships among them using statistical techniques. This type of research is widely used in education, psychology, sociology, economics, and natural sciences because it provides objective, reliable, and precise results. The characteristics of quantitative research help us understand its nature, purpose, and importance in research studies.

The main characteristics of quantitative research are described below:

1. **Uses Numerical Data** - Quantitative research focuses on numbers and measurements instead of opinions or feelings. It collects data that can be counted, like percentages, scores, or frequencies. For example, a researcher might record how many students passed a test or how often people use social media.
2. **Objective and Unbiased** - This type of research tries to stay neutral and avoid personal opinions. The researcher does not influence the results but relies on facts and data. Because the findings are based on numbers, they are considered more accurate and less likely to be biased.
3. **Hypothesis Testing** - Quantitative research often starts with a hypothesis — a statement or prediction that the researcher wants to test. For example, a hypothesis could be “Students who study daily score higher on exams.” The research then collects data to prove or disprove this statement.
4. **Uses Closed-Ended Questions** - Quantitative research often uses questions with fixed answer options, like multiple-choice or yes/no questions. This makes it easier to count and compare responses across many people.
5. **Large Sample Size** - Quantitative studies often include a large number of participants. A bigger sample makes the results more accurate and generalizable to the

whole population. For example, a survey of 1,000 students gives a clearer picture of their study habits than a survey of only 10 students.

6. **Generalization of Results** - One of the main goals of quantitative research is to generalize the findings. This means the results from a sample group can be applied to a larger population. Because the data are numerical and objective, the conclusions are more widely applicable.
7. **Deductive Approach** - Quantitative research usually follows a deductive approach, meaning it begins with a theory or hypothesis and then tests it through data collection and analysis. Researchers start with an idea, collect numerical evidence, and see whether the evidence supports or rejects the idea. This approach helps in confirming or refining existing theories.
8. **Data Presented in Charts and Graphs** - Quantitative research findings are often presented visually through tables, charts, and graphs. This helps to simplify complex numerical data and make results easy to understand and interpret. It also allows readers to quickly notice patterns and differences.
9. **Produces Clear and Precise Results** - Because quantitative data is numerical and analyzed scientifically, the results are clear, precise, and easy to interpret. Conclusions drawn from such data are based on evidence and help in making correct decisions and predictions.
10. **Systematic and Well-Organized** - Quantitative data is organized in a systematic manner using tables, frequency distributions, and diagrams. This proper organization helps in easy understanding, quick reference, and accurate interpretation of the data.

#### **STOP TO CONSIDER**

Quantitative research usually follows a deductive approach, meaning it begins with a theory or hypothesis and then tests it through data collection and analysis. Researchers start with an idea, collect numerical evidence, and see whether the evidence supports or rejects the idea. This approach helps in confirming or refining existing theories.

### **CHECK YOUR PROGRESS**

3. Why quantitative research is considered objective in nature?
4. How does quantitative research help in generalization of results?

## **2.6 Types of Quantitative Research**

Quantitative research is a systematic method of study that focuses on collecting and analyzing numerical data to understand phenomena, test relationships, and draw objective conclusions. Depending on the purpose of the study, the nature of variables, and the way data is collected and analyzed, quantitative research can be classified into different types. Each type serves a specific research need and helps researchers study problems in a scientific and measurable way. The major types of quantitative research are explained below:

### **1. Descriptive Research**

Descriptive research is one of the most common types of quantitative research. Its main purpose is to describe the existing conditions, characteristics, or situations as they are. It does not try to change or control variables but simply observes and records information in numerical form. For example, it may study students' academic performance, attendance rate, or study habits. Data is usually collected through surveys, questionnaires, tests, and records. This type of research helps in understanding “what is happening” in a particular situation.

### **2. Experimental Research**

Experimental research focuses on finding cause-and-effect relationships between variables. In this type, the researcher deliberately manipulates one variable, called the independent variable, to observe its effect on another variable, called the dependent variable. The study is conducted under controlled conditions, and participants are often divided into experimental and control groups. Experimental research is widely used in education and psychology to test the effectiveness of new teaching methods,

instructional materials, or interventions. It provides highly reliable and scientific results.

### **3. Quasi-Experimental Research**

Quasi-experimental research is similar to experimental research but does not involve full control over all variables. Random selection of participants may not be possible in real-life situations such as schools or communities. Even though it lacks complete control, this type of research still uses numerical data and statistical analysis. It is useful in practical situations where true experimental conditions cannot be created.

### **4. Correlational Research**

Correlational research studies the relationship between two or more variables without manipulating them. It helps in understanding whether variables are related and how strong the relationship is. For example, it may study the relationship between study time and academic achievement. Data is collected in numerical form and analyzed using correlation techniques. This type of research does not establish cause and effect but helps in prediction and understanding patterns.

### **5. Survey Research**

Survey research is widely used to collect data from a large population. It focuses on studying opinions, attitudes, behaviors, and characteristics of people in numerical form. Surveys use structured questionnaires, rating scales, and interview schedules. This type of research is useful in social sciences and education because it allows generalization of results to a wider population.

### **6. Longitudinal Research**

Longitudinal research involves collecting data from the same group over a long period of time. It helps in studying changes, growth, and development patterns. Since data is measured repeatedly and expressed numerically, this type of research provides detailed information about trends and progress.

## 7. Causal-Comparative Research

Causal-comparative research, also known as ex post facto research, examines the causes or reasons for existing differences between groups. In this type, the researcher does not manipulate variables but studies situations after they have occurred. For example, it may compare the academic achievement of students from different teaching backgrounds. This type of research helps in identifying possible causes behind observed effects.

### STOP TO CONSIDER

Experimental research focuses on finding cause-and-effect relationships between variables. In this type, the researcher deliberately manipulates one variable, called the independent variable, to observe its effect on another variable, called the dependent variable. The study is conducted under controlled conditions, and participants are often divided into experimental and control groups.

### CHECK YOUR PROGRESS

5. What is causal-comparative (ex post facto) research?
6. Experimental research involves manipulation of an independent variable to observe its effect on a dependent variable. ( Write True or False )
7. Longitudinal research collects data from different groups at a single point in time. (Write True or False)

## 2.7 Summing Up

Quantitative research is a systematic and scientific method of inquiry that focuses on the collection and analysis of numerical data to understand, explain, and predict phenomena. In simple terms, it is a type of research that studies problems by using numbers, measurements, and statistical techniques. The main aim of quantitative research is to obtain objective and

accurate results that are free from personal bias. It helps researchers study facts in a measurable form and draw conclusions based on evidence rather than opinions.

The meaning of quantitative research is closely connected with its emphasis on quantity, measurement, and calculation. In this approach, information is gathered in numerical form, such as scores, percentages, frequencies, or rates. These numbers represent real-world situations in a precise manner. For example, instead of asking how students feel about a subject, quantitative research measures their performance through test scores or grades. This numerical representation makes the data easier to organize, compare, and analyze.

The characteristics of quantitative research further explain its nature and usefulness. One major characteristic is objectivity, as the findings are based on numerical evidence rather than personal interpretations. Another characteristic is precision, because measurements and calculations provide exact results. Quantitative research is also structured and systematic, as it follows a clear sequence of steps from problem identification to data interpretation. Moreover, it allows comparison between groups and situations, making it easier to study relationships among variables. Since it often involves large samples, the results can be generalized to a wider population. Reliability and validity are also key characteristics, as standardized tools ensure consistency and accuracy of data.

## **2.8 Sample Questions**

1. Describe the different types of quantitative research. Explain each type with suitable examples.
2. Explain the meaning and concept of quantitative research.
3. Describe the characteristics of quantitative research.
4. Discuss the tools and techniques used for data collection in quantitative research.

## **2.9 References and Suggested Readings**

- Koul, Lokesh, (2021) “Methodology of Educational Research” Vikas Publishing House PVT LTD, New Delhi
- Mangal, S.K., Mangal, Shubhra., (2021), “Research Methodology in Behavioural Sciences”, PHI Learning PVT LTD, New Delhi

- Travers, R.M.W. (1969) “An Introduction to Educational Research”, Second edition. New York:Macmillan
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- Best, J. W., & Kahn, J. V. (2015). *Research in education* (10th ed.). Pearson Education.

## 2.10 Answers to Check Your progress

### Answers to Check Your Progress 1 -

Quantitative research is a type of research that focuses on collecting and analyzing numerical data. It studies problems by measuring numbers, quantities, and facts rather than opinions or feelings. The main purpose is to find patterns, relationships, or differences using objective and measurable data. In this research, information is collected using tools like questionnaires, tests, surveys, and rating scales. The data is analyzed using statistical methods to draw accurate conclusions. It is structured, systematic, and reliable, which makes it scientific. Quantitative research helps in making decisions, predictions, and generalizations based on evidence.

### Answers to Check Your Progress 2 -

Quantitative research is called a scientific method because it follows a systematic and organized process to study problems. It collects numerical data that can be measured and analyzed accurately. The research is objective, meaning personal opinions or feelings of the researcher do not affect the results. It uses structured tools like questionnaires, tests, and surveys to ensure uniformity. Data is analyzed using statistical methods, which provide precise and logical conclusions. The findings can be tested, verified, and replicated by other researchers. This combination of structure, measurement, and evidence makes quantitative research scientific and reliable.

### Answers to Check Your Progress 3 -

Quantitative research is considered objective because it relies on numbers and measurable facts rather than personal opinions or feelings. The researcher follows

fixed procedures and uses standardized tools like questionnaires, tests, and rating scales. The data collected is uniform and consistent, so it does not change according to who collects it. Analysis is done using statistical methods, which are unbiased and precise. This helps in drawing logical and factual conclusions. Results can be verified or repeated by other researchers. Because it focuses on evidence and facts, quantitative research is truly objective in nature.

#### **Answers to Check Your Progress 4 -**

Quantitative research helps in generalization because it often studies a large number of participants using a representative sample. The data is collected in numerical form, which makes it easier to analyze and compare. Researchers use structured tools like questionnaires, tests, and surveys to ensure uniformity. Statistical analysis is applied to identify patterns, trends, and relationships. Since the sample represents the larger population, the findings can be applied to similar groups or situations. This allows researchers to make informed predictions and decisions. By relying on measurable and systematic data, quantitative research ensures that results are generalizable and reliable.

#### **Answers to Check Your Progress 5 -**

Causal-comparative research, also called ex post facto research, is a type of quantitative research that studies the possible causes of existing differences between groups. In this research, the researcher does not manipulate variables, but examines events or conditions that have already occurred. It helps in understanding why differences exist in academic achievement, behavior, or performance. Data is collected in numerical form using tests, questionnaires, or records. The researcher then compares groups to find patterns or relationships. This method is useful when experiments are not possible due to ethical or practical reasons. Causal-comparative research helps in identifying possible reasons behind observed effects in real-life situations.

#### **Answers to Check Your progress 6 - True**

#### **Answers to Check Your progress 7 – False**

---x---

## UNIT- 3

# DIFFERENCES BETWEEN QUALITATIVE AND QUANTITATIVE RESEARCH, COMMON ASPECTS OF QUALITATIVE AND QUANTITATIVE RESEARCH, ADVANTAGES AND DISADVANTAGES OF QUALITATIVE AND QUANTITATIVE RESEARCH

### Unit Structure:

- 3.1 Introduction
- 3.2 Objectives
- 3.3 Meaning of Qualitative Research
- 3.4 Meaning of Quantitative Research
- 3.5 Differences between Qualitative and Quantitative Research
- 3.6 Common aspects of Qualitative and Quantitative Research
- 3.7 Advantages of Qualitative Research
  - 3.7.1 Disadvantages of Qualitative Research
- 3.8 Advantages of Quantitative Research
  - 3.8.1 Disadvantages of Quantitative Research
- 3.9 Summing Up
- 3.10 Sample Questions
- 3.11 References and Suggested Readings
- 3.12 Answer to Check Your Progress

### 3.1 Introduction

A dear learner, as we have already studied in your previous units, Research is a careful and systematic process of finding answers to questions or solving problems. It helps in gaining new knowledge, understanding facts, and improving existing ideas. Through research, people explore different situations, collect information, and draw conclusions to make informed decisions. Research plays a very important role in education, science, health, and social studies because it helps to understand the world more clearly and to bring positive changes. There are mainly two types of research methods — qualitative research and quantitative research. Both are used to study human behaviour, social issues, and different kinds of

problems, but they differ in how they collect and analyze data. Qualitative research deals with non-numerical information such as words, experiences, feelings, and opinions. It aims to understand people's thoughts and emotions in depth. It is often used when the researcher wants to explore the meaning behind human behaviour or social situations. Methods like interviews, observations, and case studies are commonly used in qualitative research. It provides detailed and descriptive information that helps to explain *why* and *how* something happens. Quantitative research, on the other hand, deals with numerical data. It focuses on collecting measurable information that can be analyzed statistically. This type of research uses surveys, questionnaires, and experiments to gather data from a large number of people. Quantitative research helps to find patterns, test theories, and make predictions. It provides results that are clear, structured, and can be easily compared. In this unit, we will discuss the differences between qualitative and quantitative research, the common features they share, as well as the advantages and disadvantages of both qualitative and quantitative research methods.

### 3.2 Objectives

After going through this unit, you will be able to–

- *comprehend* the meaning of Qualitative and Quantitative research;
- *distinguish* between Qualitative and Quantitative Research;
- *know* about the common aspects of Qualitative and Quantitative Research;
- *discuss* about the advantages and disadvantages Qualitative Research;
- *describe* about the advantages and disadvantages Quantitative Research.

### 3.3 Meaning of Qualitative Research

Qualitative research is a type of research that focuses on understanding human experiences, behaviours, and social phenomena through detailed and descriptive data. Unlike quantitative research, which deals with numbers and measurements, qualitative research explores the deeper meanings, feelings, and motivations behind people's actions and interactions. It seeks to answer “why” and “how” questions rather than “how many” or “how much.” The main aim of qualitative research is to gain insight into people's perspectives and the context in

which they live or behave. It helps researchers understand how individuals interpret their experiences and how social realities are formed through language, communication, and culture. Data in qualitative research are collected through various methods such as interviews, focus groups, observations, case studies, and document analysis. The data are often presented in the form of words, pictures, or narratives rather than numbers or statistics.

Qualitative research is flexible and open-ended. It allows researchers to explore topics in depth and to adjust their focus as new insights emerge during the study. The researcher plays an important role in the research process, as their interpretation helps to make sense of the collected information. This type of research is commonly used in the fields of education, psychology, sociology, and other social sciences where understanding human feelings and social interactions is essential. It helps in developing theories, generating new ideas, and understanding complex social problems.

### **3.4 Meaning of Quantitative research**

Quantitative research is a type of research that focuses on collecting and analyzing numerical data to understand patterns, relationships, or trends. It deals with measurable variables and uses statistical tools to draw conclusions. Unlike qualitative research, which explores meanings and experiences, quantitative research aims to measure and quantify facts, behaviors, or opinions objectively. It answers questions such as “how many,” “how much,” or “to what extent.” The main purpose of quantitative research is to produce data that can be represented in numbers and analyzed mathematically. This helps researchers make predictions, test hypotheses, and establish cause-and-effect relationships. It is commonly used in fields like education, psychology, economics, and the natural sciences, where accuracy and generalization of results are important. Quantitative research provides clear, precise, and objective data that help in drawing general conclusions about a population. It emphasizes measurement, reliability, and statistical analysis. By using numerical data, it helps researchers make informed decisions, test theories, and explain phenomena with evidence-based results. It is a vital approach for studies that require accuracy, comparison, and generalization.

### **3.5 Differences between Qualitative and Quantitative Research**

The following are the differences between qualitative and quantitative research:

1. Qualitative research focuses on understanding people's thoughts, feelings, and experiences in detail, while quantitative research focuses on measuring facts and data using numbers.
2. Qualitative research collects non-numerical data like words, stories, or observations, whereas quantitative research collects numerical data such as percentages, averages, or statistical figures.
3. Qualitative research tries to explore ideas and gain deep understanding, while quantitative research tries to test hypotheses and prove relationships between variables.
4. In qualitative research, information is gathered through interviews, discussions, and observations, but in quantitative research, data are collected through surveys, questionnaires, or experiments.
5. The sample size in qualitative research is usually small so that detailed information can be collected, while quantitative research uses large samples to make the results more general and accurate.
6. The questions in qualitative research are open-ended to allow people to express their opinions freely, while in quantitative research the questions are close-ended to get clear and specific answers.
7. Data analysis in qualitative research involves describing and interpreting meanings, whereas in quantitative research it involves using mathematical and statistical methods.
8. Qualitative research gives deep and detailed understanding of a topic, while quantitative research provides measurable and comparable results.
9. In qualitative research, the researcher is directly involved with participants and interprets data personally, while in quantitative research, the researcher stays objective and avoids personal influence.

10. Qualitative research is flexible and may change as the study progresses, while quantitative research follows a fixed and structured plan from beginning to end.

#### **STOP TO CONSIDER**

- Qualitative research uses non-numerical data such as words, opinions, and observations, while quantitative research uses numerical data like statistics, percentages, and measurements.
- Qualitative research aims to understand meanings, experiences, and behaviors in depth, whereas quantitative research focuses on measuring variables and testing theories using data and numbers.

#### **CHECK YOUR PROGRESS**

1. Which type of research deals with numerical data — qualitative or quantitative?
2. Which type of research is more subjective — qualitative or quantitative?

### **3.6 Common Aspects of Qualitative and Quantitative Research**

The common features of qualitative and quantitative research are explained below.

1. Both qualitative and quantitative research aim to gain a better understanding of a problem or topic through systematic and organized study.
2. Both types of research follow specific steps such as identifying a problem, collecting data, analyzing information, and drawing conclusions.
3. In both methods, researchers try to find answers to research questions and contribute new knowledge or understanding in their field.
4. Both qualitative and quantitative researches rely on careful planning and a clear research design to ensure that the study is valid and meaningful.
5. In both methods, data are collected from real-life situations, people, or sources to understand a certain issue or phenomenon.

6. Both types of research require ethical consideration, such as gaining consent from participants and ensuring honesty in reporting results.
7. Both involve interpretation and explanation of the collected data, although the process and tools used may differ.
8. In both qualitative and quantitative research, the researcher needs to remain unbiased and avoid personal opinions from influencing the findings.
9. Both use various tools and techniques for collecting data, such as interviews, surveys, or observations, depending on the purpose of the study.
10. In both types of research, the final goal is to present findings in a clear, logical, and understandable way so that others can learn from or use the results.

#### **STOP TO CONSIDER**

- Both qualitative and quantitative research aim to collect information in a systematic way to understand a problem and find answers to research questions.
- Both types of research follow organized steps such as identifying a problem, collecting data, analyzing results, and drawing conclusions to gain meaningful knowledge.

#### **CHECK YOUR PROGRESS**

3. Both qualitative and quantitative research aim to gain knowledge and understanding. (True/False)
4. Qualitative and quantitative research both start with identifying a research problem. (True/ False)

### **3.7 Advantages of Qualitative Research**

The following are the advantages of qualitative research:

1. **Gives deep understanding:** Qualitative research helps researchers understand people's thoughts, feelings, and experiences in a detailed way. It goes beyond numbers and explores the reasons behind actions and behaviors.

2. **Explains human behaviour:** This method helps explain *why* people act or think in a certain way. It studies real-life situations, which helps in understanding emotions, motivations, and social relationships.
3. **Flexible in nature:** Qualitative research does not follow a strict structure. The researcher can change questions or methods during the study if something new is discovered, allowing for deeper exploration.
4. **Useful for new ideas:** It helps to generate new ideas, theories, or concepts that can be studied further using other methods. It is especially useful when there is little existing information about a topic.
5. **Encourages detailed responses:** Since it uses open-ended questions, participants can freely share their experiences and opinions, leading to rich and meaningful information.
6. **Focuses on natural settings:** Qualitative research studies people in their natural environments—such as homes, schools, or workplaces—so the data collected are realistic and closely related to real life.
7. **Builds a strong researcher-participant relationship:** The researcher often interacts closely with participants, which helps create trust. This personal connection often leads to more honest and detailed answers.
8. **Captures feelings and emotions:** Unlike numerical research, qualitative research captures emotional and personal experiences, which helps in understanding the deeper side of human life and social issues.
9. **Provides context to data:** It helps researchers understand the background and situation in which behaviour occurs, giving meaning to the data rather than just raw facts or numbers.
10. **Useful in education, health, and social studies:** Qualitative research is widely used in areas like teaching, healthcare, and social work because it helps to understand people's needs, attitudes, and problems in real situations.

### 3.7.1 Disadvantages of Qualitative Research

The following are the disadvantages of qualitative research:

1. **Time-consuming process:** Qualitative research takes a lot of time because it involves long interviews, observations, and detailed analysis of data. Collecting and interpreting such information can take weeks or even months.
2. **Small sample size:** It usually studies a small number of people, which means the results cannot always be applied to a large population. The findings represent only the specific group studied.
3. **Difficult to generalize results:** Since the study focuses on individual experiences, it is hard to make general conclusions that fit everyone or all situations.
4. **Subjective interpretation:** The researcher's personal opinions and experiences can sometimes affect how the data are understood or explained, leading to biased results.
5. **Lack of statistical support:** Qualitative research does not use numbers or statistics, so it is harder to measure accuracy or prove the results in a mathematical way.
6. **Hard to analyze and compare:** The data are usually in the form of words, stories, or an observation, which makes it difficult to organize, compare, or summarize like numerical data.
7. **Depends on researcher's skill:** The quality of results depends heavily on how skilled the researcher is in asking questions, observing people, and interpreting answers. An inexperienced researcher may misinterpret the findings.
8. **Difficult to repeat:** It is not easy to repeat a qualitative study and get the same results because human behaviour and situations change, making it less reliable for repeated testing.
9. **Emotional involvement:** Researchers often get personally involved with participants, which can influence their judgment and make it hard to stay completely neutral.
10. **Limited scope for large studies:** Because of the detailed nature of data collection, qualitative research cannot cover a large number of participants or wide geographical areas, limiting its overall scope.

### STOP TO CONSIDER

- **Advantages:**

- Qualitative research provides a deep understanding of people's thoughts, feelings, and experiences in their natural settings.
- It allows flexibility, so researchers can explore new ideas and adjust their study as it progresses.

- **Disadvantages:**

- It usually involves a small number of participants, so the results cannot be easily applied to a larger population.
- The researcher's personal views may influence the interpretation of data, which can affect the accuracy of the findings.

### 3.8 Advantages of Quantitative Research

The following are the advantages of quantitative research:

1. **Gives accurate and measurable results:** Quantitative research uses numbers and statistics, which make the findings clear, specific, and easy to measure. This helps in getting accurate and reliable results.
2. **Covers large sample size:** It collects data from a large number of people, which makes the results more representative and easier to apply to a bigger population.
3. **Helps in testing theories:** This type of research is useful for checking whether a theory or idea is true. Researchers can test relationships between variables and confirm results through data.
4. **Uses structured methods:** Quantitative research follows a fixed plan using tools like surveys, questionnaires, or experiments, which ensures consistency and reduces confusion.
5. **Easy to analyze with statistics:** Since the data are in numerical form, they can be easily analyzed using statistical methods, graphs, and charts. This makes it simpler to understand and present results.

6. **Objective and unbiased:** Quantitative research focuses on numbers and facts, not personal opinions. This helps to reduce bias and ensures that the results are more objective and trustworthy.
7. **Results can be compared and repeated:** Because of its structured design, the same study can be repeated by other researchers to check the reliability of the findings, making it more scientific.
8. **Saves time during analysis:** Once data are collected, analysis is faster because computer software and statistical tools can quickly calculate results and patterns.
9. **Useful for making predictions:** Quantitative research helps to predict future trends or behaviors based on current data, which is very useful in fields like economics, education, and health.
10. **Supports decision-making:** The clear and measurable data from quantitative research help governments, organizations, and institutions make informed decisions and create effective policies or programs.

### 3.8.1 Disadvantages of Quantitative Research

The following are the disadvantages of quantitative research:

1. **Lacks depth of understanding:** Quantitative research focuses on numbers and statistics, so it does not provide deep insight into people's emotions, feelings, or experiences. It tells *what* happens but not *why* it happens.
2. **Limited flexibility:** This type of research follows a fixed structure and cannot be easily changed once the study begins, which means new ideas or issues that appear during research may be ignored.
3. **Does not capture human emotions:** Since the data are numerical, it cannot express personal experiences, motivations, or emotions that may be important for understanding behavior.
4. **May miss context:** Quantitative research often collects data through surveys or experiments, but it may overlook the background or situation in which the behavior occurs.

5. **Risk of biased questions:** If the survey or questionnaire is not well designed, it can lead to biased answers, which affects the accuracy of the findings.
6. **Needs large samples:** For accurate results, quantitative research usually requires a large number of participants, which can be difficult, expensive, and time-consuming to manage.
7. **Data collection can be costly:** Conducting large surveys or experiments often needs money, equipment, and trained staff, making it more expensive than small-scale qualitative studies.
8. **Can oversimplify complex issues:** Reducing human behavior to numbers may ignore the complexity of social or emotional situations, giving an incomplete picture of reality.
9. **Limited interaction with participants:** Researchers usually do not interact deeply with participants, so they might miss personal insights or misunderstand the meaning behind the answers.
10. **Difficult to adapt to new situations:** Quantitative research is designed to test specific hypotheses, so it may not work well when studying new or unexplored topics that need open-ended exploration.

#### **STOP TO CONSIDER**

##### **Advantages:**

- Quantitative research provides accurate and measurable results because it uses numbers and statistics. This helps researchers make clear comparisons and draw reliable conclusions.
- It allows data to be collected from a large number of people, which makes the findings more general and applicable to a wider population.

##### **Disadvantages:**

- Quantitative research focuses only on numbers and does not explore people's feelings or experiences in depth, so it may miss the reasons behind certain behaviors.

- It follows a fixed and structured design, which makes it less flexible and unable to adjust if new ideas or issues arise during the study.

### **CHECK YOUR PROGRESS**

5. Which is a major advantage of qualitative research — depth of understanding or numerical accuracy?
6. Is qualitative research flexible or rigid in nature?

### **3.9 Summing Up**

Qualitative research deals with non-numerical data such as words, feelings, experiences, and opinions. It focuses on understanding people’s thoughts and behaviors deeply. The researcher studies people in their natural settings and tries to find meanings behind actions. Methods like interviews, observations, and case studies are commonly used. On the other hand, quantitative research deals with numerical data. It focuses on measuring variables and testing hypotheses using statistical tools. It collects data through surveys, experiments, and questionnaires to get measurable and comparable results.

The main difference between qualitative and quantitative research lies in the type of data and approach. Qualitative research uses descriptive information, while quantitative research uses numerical data. Qualitative research explores “why” and “how” things happen, whereas quantitative research focuses on “what,” “how much,” and “how often.” Qualitative research is flexible and open-ended, while quantitative research is structured and follows a fixed plan. The sample size in qualitative studies is small, but it provides deep insights, while quantitative studies use large samples for generalization.

Despite their differences, both have some common aspects. Both qualitative and quantitative research aim to gain knowledge and find answers to research questions. They follow systematic steps—such as identifying a problem, collecting data, analyzing it, and drawing conclusions. Both methods require ethical conduct, honesty, and accuracy. In both, the researcher must plan carefully, remain unbiased, and present results clearly so that others can understand or use them.

### 3.10 Sample Questions and Answers

1. Discuss the common features shared by qualitative and quantitative research.
2. Describe the differences between qualitative and quantitative research.
3. Discuss in detail the major advantages and disadvantages of qualitative research.
4. Describe the advantages and disadvantages of quantitative research methods. How can researchers overcome the limitations of this approach?
5. Explain how qualitative and quantitative research approaches are used in educational research.

### 3.11 References and Suggested Readings

- Koul, Lokesh, (2021) “Methodology of Educational Research” Vikas Publishing House PVT LTD, New Delhi
- Mangal, S.K., Mangal, Shubhra., (2021), “Research Methodology in Behavioural Sciences”, PHI Learning PVT LTD, New Delhi
- Travers, R.M.W. (1969) “An Introduction to Educational Research”, Second edition. New York:Macmillan
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- Best, J. W., & Kahn, J. V. (2015). *Research in education* (10th ed.). Pearson Education.

### 3.12 Answer to Check Your Progress

**Answer to Check Your Progress 1 :** Quantitative research

**Answer to Check Your Progress 2:** Qualitative research

**Answer to Check Your Progress 3:** True

**Answer to Check Your Progress 4:** True

**Answer to Check Your Progress 5:** Depth of understanding

**Answer to Check Your Progress 6:** Flexible in nature

---x---

## UNIT- 4

### QUALITATIVE DATA ANALYSIS – ORGANISATION OF QUALITATIVE DATA, ANALYSIS AND INTERPRETATION OF QUALITATIVE DATA

#### Unit Structure:

- 4.1 Introduction
- 4.2 Objectives
- 4.3 Meaning of Qualitative Data
- 4.4 Approaches used in collecting data of Qualitative Nature
- 4.5 Organization of Qualitative Data
  - 4.5.1 Nature of Qualitative Data
  - 4.5.2 Need for organizing Qualitative Data
  - 4.5.3 Steps in organizing Qualitative Data
- 4.6 Analysis and Interpretation of Qualitative Data
- 4.7 Importance of Data analysis and Interpretation
- 4.8 Summing Up
- 4.9 Sample Questions
- 4.10 References and Suggested Readings

#### 4.1 Introduction

Dear learners, as we already know that, in qualitative research, the main goal is to understand people's thoughts, feelings, and experiences in depth. After collecting information through interviews, observations, or documents, the researcher must organize, analyze, and interpret the data carefully. Organization of qualitative data analysis means arranging and preparing the collected information in a clear and systematic way so that it becomes easy to study. This includes writing down notes, transcribing interviews, sorting data, and coding important points. Once the data is organized, the next step is analysis, which involves identifying patterns, categories, and themes that explain the meaning of the information. The researcher reads the data several times to find common ideas or behaviors. After analysis comes interpretation, where the researcher explains what the data means, why certain patterns appear, and how the findings relate to the research questions. Together, organization, analysis,

and interpretation help turn raw information into meaningful understanding. They allow the researcher to draw logical conclusions and provide deep insights into human experiences. Without these steps, qualitative research would only be a collection of words without meaning or direction. In this unit, we will learn about how qualitative data is organized, as well as how it is analyzed and interpreted.

## 4.2 Objectives

After going through this unit, you will be able to –

- *comprehend* the meaning of Qualitative Research;
- *know* about the Approaches used in collecting data of qualitative nature;
- *describe* the Organization of qualitative data along with its nature, need and steps;
- *explain* the Analysis and Interpretation of qualitative data;
- *understand* the Importance of Data analysis and Interpretation.

## 4.3 Meaning of Qualitative Research

Qualitative research is a type of research that focuses on understanding people's experiences, feelings, thoughts, and social situations in depth. It does not deal with numbers or measurements but with words, actions, and meanings. The main aim of qualitative research is to explore how and why things happen in a particular context rather than just what happens. In this kind of research, information is collected through methods like interviews, observations, group discussions, case studies, and document analysis. The researcher studies people in their natural environment to get a clear picture of their real-life experiences. For example, a qualitative study may explore how teachers motivate students in class or how patients feel about hospital care.

Qualitative research uses descriptions, stories, and themes to explain results. It gives a deeper understanding of human behaviour, relationships, and emotions. The researcher becomes closely involved with the participants to understand their viewpoints. In simple words, qualitative research helps us understand the *meaning* behind human actions and social

experiences. It focuses on quality and depth of information rather than quantity, making it very useful in education, psychology, sociology, and social science studies.

#### **4.4 Approaches Used collecting data of Qualitative Nature**

Qualitative data uses different approaches to understand people's experiences, thoughts, and behaviors in a natural setting. These approaches help researchers collect and study detailed information that explains why and how something happens, rather than just measuring it with numbers.

Below are the approaches used in qualitative data:

##### **1. Case Study Approach**

This approach studies one person, group, or situation in depth. It helps the researcher understand a real-life problem or experience in detail. For example, studying how one school improves student motivation.

##### **2. Ethnographic Approach**

In this approach, the researcher spends time with a group of people in their natural environment to understand their culture, lifestyle, and daily activities. For example, studying the classroom culture of a particular school.

##### **3. Phenomenological Approach**

This approach focuses on people's personal experiences and feelings about a certain situation. It helps to understand how individuals experience and give meaning to events in their lives. For example, understanding how students feel during exams.

##### **4. Grounded Theory Approach**

Here, the researcher collects data and then develops a theory based on the information gathered. The theory "comes from the ground," meaning it is built from real experiences instead of existing ideas. For example, forming a theory about how teachers manage classroom stress.

## 5. Narrative Approach

This approach uses people's life stories or personal experiences to understand how they make sense of their lives. The researcher collects and analyzes stories to find meanings and patterns. For example, studying the life story of a teacher or student.

## 6. Historical Approach

This approach studies past events and records to understand how and why things happened. It helps to connect the past with the present. For example, researching the history of women's education or changes in teaching methods.

### STOP TO CONSIDER

The main approaches used in the qualitative method are:

1. Case Study
2. Ethnography
3. Phenomenology
4. Grounded Theory
5. Narrative Research
6. Historical Research

## 4.5 Organization of Qualitative Data

In any research process, after collecting data, the next essential step is to organize it properly so that it can be analyzed, interpreted, and understood clearly. In qualitative research, data are usually in the form of words, sentences, notes, interviews, observations, diaries, or documents rather than numbers. Because qualitative data are rich, descriptive, and sometimes very large in volume, organizing them systematically becomes very important. The organization of qualitative data means arranging, managing, and preparing the collected data in a way that it becomes meaningful and ready for analysis. It is the process of turning raw data into a well-structured form that helps the researcher identify themes, patterns, and categories.

### 4.5.1 Nature of Qualitative Data

Before understanding the organization process, it is important to know the nature of qualitative data. Qualitative data are usually non-numerical, descriptive, and subjective in nature. They come from interviews, case studies, focus groups, personal narratives, documents, and field notes. Such data represent the participants' experiences, feelings, attitudes, and behaviours. Because qualitative data are often lengthy and unstructured, they need careful handling to avoid confusion and data loss.

### 4.5.2 Need for Organizing Qualitative Data

The organization of qualitative data is necessary for several reasons:

1. **To make sense of the data:** Qualitative data are complex and detailed. Organizing them helps researchers identify what is important and relevant to the study.
2. **To prepare for analysis:** Without organization, it is very difficult to analyze or interpret large amounts of textual data.
3. **To avoid confusion:** Proper organization prevents the researcher from feeling overwhelmed by massive amounts of raw data.
4. **To maintain accuracy:** A systematic organization ensures that no valuable information is lost or misinterpreted.
5. **To ensure transparency:** When data are clearly organized, other researchers can understand and verify the findings easily.

### 4.5.3 Steps in Organizing Qualitative Data

The organization of qualitative data involves several systematic steps. Each step helps in making the data ready for analysis and interpretation.

1. **Data Collection and Preparation** - The first step begins with collecting data through various qualitative methods such as interviews, observations, group discussions, or documents. Once collected, all materials—audio recordings, field notes, transcripts, and documents—need to be properly labeled, dated, and stored safely.

2. **Transcription of Data** - When data are collected through interviews or focus groups, they are often recorded. These recordings must be transcribed—that is, converted into written text. Transcription is a careful process of listening to each recording and writing down every word, pause, and tone if necessary. This written version becomes the base for analysis. It is important that transcription is done accurately to reflect the real meaning of participants' responses.
3. **Reading and Familiarization** - After transcription, the researcher must read and re-read the data to become familiar with it. This step helps in gaining an overall understanding of what participants have expressed. Reading repeatedly allows the researcher to notice initial ideas, emotions, or key phrases that might later become codes or themes. This process builds a connection between the researcher and the data.
4. **Coding the Data** - Coding is one of the most crucial steps in organizing qualitative data. A code is a word or short phrase that captures the essence of a particular segment of the data. For example, if a teacher says, "Students feel more confident when they participate in group discussions," this statement may be coded as '*student confidence*' or '*group participation*'.

In this stage, researchers go through the data line by line and assign codes to sentences or paragraphs that express important ideas. Coding helps in breaking down large text into manageable pieces and highlights patterns or repeated ideas.

5. **Categorization-** After coding, similar codes are grouped together into categories. A category is a broader concept that contains several related codes. For instance, codes like '*student confidence*,' '*motivation to learn*,' and '*self-expression*' may be grouped under the category '*personal development*.'

Categorization helps to reduce the complexity of the data and provides an organized framework for analysis. It also enables the researcher to identify relationships among different pieces of information.

6. **Developing Themes** - Once categories are formed, the next step is to develop themes. Themes are the major ideas or patterns that emerge from the data.

They represent the central meaning of what participants have shared. For example, if several categories such as *'teacher support,'* *'peer encouragement,'* and *'safe classroom environment'* appear, they might form a broader theme like *'factors promoting student engagement.'*

Themes give a clear picture of the underlying messages in the data and form the foundation for analysis and interpretation.

**7. Data Display and Organization Tools** - To make data easier to understand and interpret, researchers often display it using various tools such as:

- **Matrices or tables:** To show relationships between codes or themes.
- **Charts or diagrams:** To visualize connections between categories.
- **Concept maps:** To display how ideas are linked to each other.

Modern researchers also use computer-assisted qualitative data analysis software (CAQDAS) such as NVivo, ATLAS.ti, or MAXQDA. These tools help in storing, coding, and categorizing data systematically, especially when dealing with large amounts of information.

**8. Data Reduction** -During the organization process, not all collected data may be relevant to the research questions. Therefore, researchers engage in data reduction, where unnecessary or repetitive information is removed. This does not mean deleting important details, but rather focusing on the most meaningful and significant parts that answer the research objectives.

**9. Data Verification** - Before moving to analysis, it is essential to check the accuracy and consistency of the organized data. Researchers review the codes, categories, and themes to ensure they truly represent the participants' responses. Peer review, member checking, or triangulation can also be used to verify the credibility of the data.

**10. Documentation and Storage** - Finally, organized data should be documented and stored safely. This includes keeping all field notes, transcripts, coded files, and analysis summaries properly labeled and filed. Proper storage ensures that data can be referred back to whenever needed and maintains the transparency and ethical responsibility of the researcher.

### **STOP TO CONSIDER**

The qualitative data gathered using open-ended questions, participant observation, in-depth interview, field notes, documents, photographs and archive records are voluminous. They need to be organized and classified into specific patterns, categories and descriptive units to avoid any chaos.

### **CHECK YOUR PROGRESS**

1. What is meant by organization of qualitative data?
2. Name any one software used for qualitative data analysis.
3. What is the difference between raw data and organized data?

#### **4.6 Analysis and Interpretation of Qualitative Data**

Research is not complete just by collecting data. Once information has been gathered, the next important step is to analyze and interpret it. In qualitative research, data usually come in the form of words, descriptions, stories, interviews, field notes, or documents rather than numbers. Therefore, the process of analysis and interpretation in qualitative research is very different from that of quantitative research.

The main aim of qualitative data analysis is to make sense of people's experiences, opinions, and meanings. It involves finding patterns, themes, and categories within the data so that researchers can explain social phenomena in a deeper and more descriptive way. Interpretation, on the other hand, means explaining what those patterns and meanings actually signify in the context of the research.

Qualitative data analysis refers to the process of examining, organizing, and understanding the non-numerical data collected during research. It helps in transforming raw data—such as interview transcripts, field notes, or open-ended responses—into meaningful insights.

Unlike quantitative analysis, which uses numbers and statistics, qualitative analysis focuses on words, feelings, behaviors, and experiences. The researcher looks for similarities, differences, and patterns in what participants say or do. It is a systematic process of identifying what is important in the data and what it means for the research questions.

The objective in the analysis of qualitative data, gathered by a wide variety of methods and techniques, is holistic perspective and studying real-world situations as they unfold naturally, non-manipulatively and unobtrusively with openness to whatever emerges without predetermined constraints on outcomes. Keeping this objective in view, the analysis of qualitative data means studying the organized material in order to discover inherent facts. The content analysis, inductive analysis and logical analysis are mostly used in analysis of qualitative data.

Interpretation is the process of explaining the meaning and significance of the analyzed data. It involves connecting the findings with existing theories, concepts, or real-life situations. In simple terms, while analysis breaks the data into parts and organizes it, interpretation gives it meaning and context. Interpretation of data is the next step after analysis. While analysis organizes and summarizes the data, interpretation explains what that data actually means. It involves drawing conclusions, understanding the implications, and linking the findings with the research objectives, theories, or previous studies.

In simple words, interpretation gives meaning to the analyzed data. It helps the researcher to understand *why* certain results have appeared, *what* they imply, and *how* they can be applied in real life or in further studies. Through interpretation, the researcher explains the significance of the findings and relates them to the research questions or hypotheses.

For example, if an interview reveals that students prefer group learning, analysis will identify “group learning” as a theme, but interpretation will explain *why* students feel that way—perhaps because it builds confidence, social connection, or teamwork.

The process of interpreting data begins by reviewing the results of the analysis. The researcher then compares the findings with the existing literature, theories, or previous studies to understand their meaning and importance. For example, if a researcher finds that most teachers face challenges in classroom management, the interpretation would explain *why* such challenges occur and *how* they affect the teaching process.

The next step is to draw conclusions based on the analyzed data. The researcher should present these conclusions clearly and logically, avoiding personal bias or assumptions. Finally, the researcher identifies the implications of the findings — that is, how they can be used in practice or in future research.

### **STOP TO CONSIDER**

The objective in the analysis of qualitative data, gathered by a wide variety of methods and techniques, is holistic perspective and studying real-world situations as they unfold naturally, non-manipulatively and unobtrusively with openness to whatever emerges without predetermined constraints on outcomes.

### **CHECK YOUR PROGRESS**

4. Data analysis in qualitative research can be done without organizing the data. (True/False)
5. Coding is an important part of qualitative data analysis. (True/false)

#### **4.7 Importance of Data Analysis and Interpretation**

Analysis and interpretation of data are the heart of any research work. They transform raw information into meaningful knowledge. Without these steps, the data collected has no value because it cannot answer the research questions or prove the hypotheses.

Through proper analysis, the researcher can identify important patterns, relationships, and insights. Interpretation, on the other hand, helps to understand the deeper meaning of those patterns. Together, they enable the researcher to make logical conclusions, test theories, and provide recommendations for solving real-world problems.

In educational research, for example, analysis and interpretation help teachers and policymakers understand students' needs, classroom challenges, or learning outcomes. In social research, they help understand social behaviors, attitudes, or cultural patterns. Thus, these steps give direction and depth to the study.

### **STOP TO CONSIDER**

Although both analysis and interpretation are closely connected, they are not the same. Analysis focuses on breaking down the data and finding patterns

or trends, while interpretation focuses on understanding the meaning and implications of those patterns.

#### **4.8 Summing Up**

To sum up, analysis and interpretation of data are essential steps in the research process. Analysis helps in organizing, summarizing, and identifying patterns within the data, while interpretation helps in understanding the meaning and importance of those findings. Together, they allow the researcher to draw conclusions and make recommendations that contribute to knowledge and practical understanding. Without proper analysis and interpretation, even the best-collected data cannot provide useful results. Therefore, every researcher must give careful attention to these stages to ensure that their study is valid, meaningful, and valuable to others. In short, analysis turns raw data into organized information, and interpretation turns that information into understanding and wisdom.

#### **4.9 Sample Questions**

1. Explain the meaning and process of organizing qualitative data. Discuss the major steps involved in the organization of qualitative data analysis.
2. Discuss the process of interpretation of qualitative data. How does interpretation help in drawing meaningful conclusions from research findings?
3. Describe the role of coding, categorizing, and theme development in organizing qualitative data for analysis.

#### **4.10 References and Suggested readings**

- Koul, Lokesh, (2021) “Methodology of Educational Research” Vikas Publishing House PVT LTD, New Delhi
- Mangal, S.K., Mangal, Shubhra., (2021), “Research Methodology in Behavioural Sciences”, PHI Learning PVT LTD, New Delhi
- Travers, R.M.W. (1969) “An Introduction to Educational Research”, Second edition. New York:Macmillan

- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- Best, J. W., & Kahn, J. V. (2015). *Research in education* (10th ed.). Pearson Education.

---x---

## UNIT- 5

### QUANTITATIVE DATA ANALYSIS – ORGANIZATION OF QUANTITATIVE DATA, ANALYSIS AND INTERPRETATION OF QUANTITATIVE DATA

#### Unit Structure:

- 5.1 Introduction
- 5.2 Objectives
- 5.3 Meaning of Quantitative Data
- 5.4 Nature of Quantitative Data
- 5.5 Organisation of Quantitative Data
  - 5.5.1 Steps in Organizing Quantitative Data
- 5.6 Analysis and Interpretation of Quantitative Data
  - 5.6.1 Interpretation of Quantitative Data
- 5.7 Types of Quantitative Variables
- 5.8 Summing Up
- 5.9 Sample Questions
- 5.10 References and Suggested Readings
- 5.11 Answers to Check Your Progress

#### 5.1 Introduction

Dear Learners, as we already know that, in research, data plays an important role in finding answers to questions and solving problems. Once a researcher collects the required data, the next step is to organize and analyze it in a proper way. This process is very important, especially in quantitative research, where data is mostly in numerical form. Quantitative research deals with numbers, measurements, and statistics, so the data must be arranged carefully to make sense of it. The data analysis as a process, thus, provides a link between the data a researcher has and the information or interpretation he can derive from his research data for addressing his research questions. The analysis for deriving meaning from the quantitative data is termed as quantitative analysis and that derived meaning from qualitative data is termed as qualitative analysis. In this unit, we would focus on organization of quantitative data as well as analysis and interpretation of quantitative data.

## 5.2 Objectives

After going through this unit, you will be able to –

- *explain* the meaning of Quantitative Data;
- *understand* the nature of Quantitative Data;
- *describe* the Organization of Quantitative data along with its steps;
- *explain* the analysis and interpretation of quantitative data.

## 5.3 Meaning of Quantitative Data

Quantitative data refers to information that can be measured and expressed in numbers. It includes data like scores, percentages, ages, heights, weights, or income levels. For example, if a researcher wants to study students' academic performance, the marks or grades obtained by students are quantitative data. Such data can be counted, compared, and statistically analyzed. Unlike qualitative data, which deals with words and meanings, quantitative data focuses on quantities and figures.

Quantitative data is mostly analyzed using statistical methods. It allows researchers to calculate averages, percentages, and relationships between variables. Because it is based on measurable facts, quantitative data is considered more objective, reliable, and scientific. It provides clear evidence that can be tested and verified, which makes it highly useful in educational, social, and scientific research.

One important feature of quantitative research is that it is objective. This means the researcher tries to remain neutral and does not allow personal feelings or opinions to affect the results. Since the data is in numerical form, it can be analyzed using statistical methods. These methods help the researcher to summarize large amounts of data, compare groups, and draw conclusions that are based on evidence rather than assumptions. Another key aspect of quantitative research is that it helps in generalization. Since it often involves a large number of participants, the findings can be applied to a wider population. For example, if a researcher studies the study habits of 1,000 students and finds a common pattern, the results may be applied to students in similar situations.

## **5.4 Nature of Quantitative Data**

The nature of quantitative data shows its key characteristics and how it behaves in research. Understanding its nature helps researchers choose suitable tools and techniques for collecting and analyzing data. The main features or nature of quantitative data are as follows:

### **1. Numerical in Form**

The most important feature of quantitative data is that it is always expressed in numbers. It deals with measurable quantities such as scores, percentages, frequencies, and averages. For example, a student's test score or a person's income can be measured numerically. This numerical nature makes it easy to calculate and compare results.

### **2. Objective and Reliable**

Quantitative data is objective, meaning it is free from personal opinions or bias. The same data will produce the same results if measured again under the same conditions. For example, if the temperature is recorded as 30°C, it is a fact that everyone can verify. This objectivity makes quantitative data reliable and suitable for scientific study.

### **3. Measurable and Verifiable**

Quantitative data can be measured using tools like scales, tests, surveys, or experiments. It can also be verified by repeating the measurement. For example, the number of hours a student studies each day can be measured by observation or record. This measurable nature ensures accuracy and helps in testing hypotheses in research.

### **4. Large Sample Size**

Quantitative research often deals with large samples to ensure that the results are accurate and representative of the population. The data collected from many individuals helps researchers to generalize the findings. Larger samples make the study more trustworthy and reduce the possibility of error.

### **5. Structured and Systematic**

Quantitative data is collected and analyzed in a structured and organized manner. The questions are usually fixed and the responses are pre-decided, such as multiple-choice or

numerical answers. This structured approach ensures uniformity and consistency in data collection, making analysis easier and more accurate.

## **6. Allows Hypothesis Testing**

Quantitative data enables researchers to test hypothesis scientifically. A hypothesis is a statement or prediction that can be tested using data. For example, “students who study more hours score higher marks.” Using quantitative data, researchers can test whether this statement is true or false through statistical analysis.

## **5.5 Organisation of Quantitative Data**

The organization of data means arranging the collected information in a clear, systematic, and logical order so that it can be easily understood and analyzed. Raw data, as collected from questionnaires, surveys, or experiments, is often unorganized and difficult to interpret. Therefore, before analysis, the data is sorted, classified, and presented in an orderly form. Data organization ensures that the information is accurate, consistent, and ready for analysis. It helps to remove confusion and errors from the dataset and makes the process of analysis smooth and meaningful.

After collecting the data through surveys, experiments, or tests, the first important step is data organization. Raw data is usually large and unstructured. Organizing it properly helps to make sense of it and prepare it for analysis.

### **5.5.1 Steps in Organizing Quantitative Data**

Organizing quantitative data involves several systematic steps. Each step prepares the data for statistical analysis and interpretation.

#### **1. Editing the Data**

The first step in organizing data is editing. It involves checking the collected data carefully to identify and correct errors or omissions. Researchers make sure that all the questions have been answered properly and that the responses are complete and accurate. If there are any mistakes or missing entries, they are corrected or clarified. For example, if a respondent writes their age as “250,” this error must be corrected

because it is not possible. Editing ensures that only clean and reliable data are used for analysis.

## **2. Coding the Data**

After editing, the next step is coding. Coding means giving symbols, numbers, or short words to represent different responses or variables. Since quantitative data is mostly numerical, coding helps to make the data easy to enter and analyze using statistical software or manual methods. For example, for the question “Gender,” male can be given code “1” and female “2.” Similarly, responses like “Agree,” “Neutral,” and “Disagree” can be given codes “3,” “2,” and “1.” Coding saves time and reduces errors during analysis.

## **3. Classification of Data**

The third step is classification, which means grouping the data into different categories based on common features or characteristics. Classification helps in understanding the data better and makes it easier to compare. Data can be classified in the following ways:

- i. Chronological classification** – Data is arranged according to time (e.g., yearly population growth).
- ii. Geographical classification** – Data is arranged according to place or location (e.g., literacy rate by state).
- iii. Qualitative classification** – Data is grouped according to qualities or attributes (e.g., gender, occupation).
- iv. Quantitative classification** – Data is grouped according to numerical values (e.g., age groups, income levels).

By classifying data, the researcher can easily identify trends and patterns among different groups.

## **4. Tabulation of Data**

After classification, the next important step is tabulation. Tabulation means presenting data in the form of tables with rows and columns. Tables help to organize large amounts of data clearly and make it easy to read and compare. Each table should have

a clear title, headings, and units of measurement. For example, a table can show the number of male and female students in different age groups. Tabulation can be simple, when it deals with one characteristic (e.g., gender), or complex, when it deals with two or more characteristics (e.g., gender and income level). Tables are a foundation for statistical analysis and graphical presentation.

## 5. Presentation of Quantitative Data

Once the data is organized and tabulated, it can be presented in different forms to make it more understandable. The presentation can be:

- i. **Textual Presentation** – Data is explained in words within the report.
- ii. **Tabular Presentation** – Data is shown in tables for easy comparison.
- iii. **Graphical Presentation** – Data is shown visually using graphs, charts, and diagrams.

Common graphical tools include bar graphs, pie charts, histograms, frequency polygons, and line graphs. Graphical presentation helps to communicate research findings quickly and effectively to the audience.

### STOP TO CONSIDER

- A researcher, for seeking answer to his research questions, collects data from a number of resources, by making use of a number of data collection techniques. This data is nothing but a variety of information used by researcher to derive relevant conclusions for addressing his research questions.
- The organization of data means arranging the collected information in a clear, systematic, and logical order so that it can be easily understood and analyzed. Raw data, as collected from questionnaires, surveys, or experiments, is often unorganized and difficult to interpret. Therefore, before analysis, the data is sorted, classified, and presented in an orderly form.

### CHECK YOUR PROGRESS

1. What is meant by quantitative data analysis?
2. What is the main purpose of quantitative data analysis?

## 5.6 Analysis and Interpretation of Quantitative Data

In any research process, after the collection and organization of data, the next important step is analysis and interpretation. Without analysis, data remains just numbers or figures without meaning. Analysis and interpretation help the researcher to understand what the data reveals and to draw meaningful conclusions from it. In quantitative research, the data collected is usually in the form of numbers, percentages, or scores. Therefore, the analysis involves the use of statistical methods to study relationships, patterns, and trends within the data. The interpretation of these results gives the final meaning and connects the findings with the research objectives.

In quantitative research, data analysis helps to:

- Identify patterns and relationships among variables.
- Test hypotheses or assumptions.
- Measure the strength of connections between variables.
- Draw general conclusions about the population from a sample.

For example, if a researcher collects students' test scores to study the relationship between study time and performance, data analysis helps in calculating averages, correlations, and differences among the groups.

Therefore, we can say that, after organizing the data, the next step is analysis where statistical tools and techniques are applied to draw meaningful results. Quantitative data analysis aims to summarize large data sets, describe characteristics, examine relationships, and tests hypothesis scientifically.

### 1. Descriptive Analysis

Descriptive analysis helps to describe the basic features of the data. It gives a simple summary of what the data shows. The main descriptive statistics include:

- **Measures of Central Tendency** – These show the average value of data. The main measures are:
  - *Mean* (average value)
  - *Median* (middle value)
  - *Mode* (most frequent value)

- **Measures of Dispersion** – These show how much the data values differ from the average. They include:
  - *Range* (difference between the highest and lowest value)
  - *Variance* (average of squared differences)
  - *Standard Deviation* (average amount of variation from the mean)

Descriptive analysis also includes frequency distribution, where data is arranged to show how often each value occurs. Charts and graphs, such as bar diagrams, pie charts, and histograms, are often used to display descriptive results clearly. Descriptive analysis provides a clear summary of the main features of the data but does not allow the researcher to make predictions or generalizations.

## 2. Inferential Analysis

Inferential analysis goes beyond description. It helps researchers to draw conclusions about a population based on a sample. It uses statistical tests to check relationships, differences, and the validity of hypotheses.

Some common inferential statistical methods include:

- **t-test** – used to compare the means of two groups.
- **ANOVA (Analysis of Variance)** – used to compare the means of three or more groups.
- **Chi-square test** – used to study relationships between categorical variables.
- **Correlation** – used to measure the strength and direction of the relationship between two variables.
- **Regression Analysis** – used to predict the value of one variable based on another.

Through inferential analysis, researchers can test whether the observed differences or relationships are real or just due to chance. It helps in making generalizations and testing hypotheses scientifically.

### 5.6.1 Interpretation of Quantitative Data

After statistical analysis, the next step is to interpret the results. Interpretation means giving meaning to the numbers and explaining what they indicate. The researcher connects the results with the research problem, theoretical framework, and objectives.

For example, if the analysis shows a strong correlation between study hours and test scores, interpretation would explain that “students who study more tend to perform better.” The interpretation also includes identifying reasons, implications, and suggestions based on the findings.

A good interpretation:

- Is logical and based on data.
- Relates the results to existing theories and literature.
- Avoids exaggeration or personal bias.
- Highlights both expected and unexpected results.
- Provides explanations for possible causes.

Interpretation transforms numbers into meaningful knowledge that contributes to understanding and solving real problems. Interpretation means explaining the meaning and importance of the analyzed data. After statistical calculations are done, the researcher must interpret the results in light of the research questions or objectives. In simple words, interpretation gives life and understanding to the numerical findings. It answers questions such as:

- What do the results mean?
- Why did this pattern appear?
- What conclusions can be drawn?
- How can the findings be applied in real life?

Therefore, Interpretation connects the numerical data with real-world meaning and theoretical understanding. It helps to make the research findings useful and understandable to others.

Both the organization of quantitative data and its analysis and interpretation are closely linked and equally important. Proper organization ensures that the data is clean, logical, and ready for analysis. Effective analysis provides factual and measurable results, while interpretation gives meaning to those results and relates them to the research questions. Together, these steps form the backbone of the entire research process. They help researchers move from mere data collection to meaningful understanding and scientific knowledge. Therefore, every researcher must pay careful attention to organizing, analyzing, and

interpreting quantitative data accurately, as these stages determine the overall quality, validity, and usefulness of the research.

#### **STOP TO CONSIDER**

- The processing of numerical or quantitative data obtained through data collection techniques by the researchers mostly in their quantitative research studies to derive necessary meaning out of it for answering their research questions is termed as quantitative data analysis.
- Quantitative data analysis involves organising, analysing and interpreting data scientifically. Organisation arranges raw data systematically, analysis applies statistical tools to extract meaning and interpretation explains results in the light of objectives. Together, these steps make research factual, logical and valuable.

#### **CHECK YOUR PROGRESS**

3. Descriptive analysis helps in summarizing data in a simple form. — (True/False)
4. Inferential analysis is used to make generalizations about a population. (True/False)
5. Coding is a process of giving symbols or numbers to data for easy handling. — (True/False)

### **5.7 Types of Quantitative Variables**

Quantitative variables are those that can be measured and expressed in numbers. They help researchers collect data that can be analyzed statistically to find patterns, relationships, and trends. These variables show how much of something exists and can be compared using mathematical operations such as addition, subtraction, or averaging. Quantitative variables are generally divided into two main types: discrete variables and continuous variables.

Discrete variables are those that can take only specific, separate values and cannot have fractions or decimals between them. They are countable in nature. For example, the number of students in a class, the number of books on a shelf, or the number of cars in a parking lot are all discrete variables. You can count them in whole numbers, but not in parts or fractions. Discrete variables are often used when the data involves counting individual items or people. They provide clear and simple numerical information, which makes them useful for studies that focus on exact counts or frequencies.

On the other hand, continuous variables can take any value within a given range, including fractions and decimals. They represent measurements rather than counts. Examples include height, weight, temperature, age, and time. For instance, a person's height could be 160.2 cm or 160.5 cm, and both are possible values. Continuous variables are measured on a scale that allows for infinite possibilities between two numbers. This type of variable is common in scientific and educational research where precision and detailed measurements are important. Continuous data allows researchers to perform more advanced statistical analyses, such as calculating averages, standard deviations, and correlations.

In short, both discrete and continuous variables are essential for quantitative research. Discrete variables deal with countable quantities, while continuous variables deal with measurable quantities. Together, they help researchers collect accurate numerical data that can be analyzed to draw conclusions, test hypotheses, and support decision-making. Understanding these types of variables is important because it helps in choosing the right statistical tools and methods for data analysis.

#### **STOP TO CONSIDER**

- Discrete variables are countable in nature.
- Continuous variables represent measurements rather than counts.

### **5.8 Summing Up**

The process of organization, analysis, and interpretation of quantitative data is one of the most important stages in any research work. Once data is collected, it does not have meaning until it is properly arranged, examined, and explained. The organization of quantitative data involves arranging the raw information in a systematic and logical order so that it can be

easily understood and analyzed. This process includes editing, coding, classifying, and tabulating the data to ensure accuracy and clarity. When the data is organized well, it becomes possible to identify trends, patterns, and relationships that may exist within it. Well-organized data also helps in removing confusion and reduces the chances of mistakes during the analysis stage. It makes large and complex information easy to handle, present, and compare. In short, data organization forms the foundation for all further stages of research and ensures that the analysis is reliable and meaningful.

After organizing the data, the next step is analysis, which involves applying suitable statistical techniques to summarize and study the data. Analysis helps to convert numbers into meaningful results by using tools such as averages, percentages, correlations, and tests of significance. Through analysis, the researcher can measure relationships between variables, test hypotheses, and draw conclusions based on facts rather than assumptions. The analysis can be descriptive, which helps to present the main features of the data in simple form, or inferential, which allows the researcher to make generalizations about a larger population from a smaller sample. The use of statistical tools in analysis gives scientific strength and objectivity to the research findings. It ensures that conclusions are drawn from evidence and not from personal opinion or bias.

Both the organization of quantitative data and its analysis and interpretation are closely linked and equally important. Proper organization ensures that the data is clean, logical, and ready for analysis. Effective analysis provides factual and measurable results, while interpretation gives meaning to those results and relates them to the research questions. Together, these steps form the backbone of the entire research process. They help researchers move from mere data collection to meaningful understanding and scientific knowledge. Therefore, every researcher must pay careful attention to organizing, analyzing, and interpreting quantitative data accurately, as these stages determine the overall quality, validity, and usefulness of the research.

## **5.9 Sample Questions**

1. What is the importance of data organization in quantitative research? Explain the various steps involved in the organization of quantitative data before analysis.

2. Explain the difference between descriptive analysis and inferential analysis in quantitative research.
3. Explain the meaning and nature of quantitative data.
4. Explain the main objectives of quantitative data analysis.

### **5.10 References and Suggested Readings**

- Koul, Lokesh, (2021) “Methodology of Educational Research” Vikas Publishing House PVT LTD, New Delhi
- Mangal, S.K., Mangal, Shubhra., (2021), “Research Methodology in Behavioural Sciences”, PHI Learning PVT LTD, New Delhi
- Travers, R.M.W. (1969) “An Introduction to Educational Research”, Second edition. New York:Macmillan
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- Best, J. W., & Kahn, J. V. (2015). *Research in education* (10th ed.). Pearson Education.

### **5.11 Answer to Check Your Progress**

#### **Answer to Check Your Progress 1**

Quantitative data analysis means studying information that is collected in the form of numbers. It involves organizing, measuring, and examining numerical data to find patterns and meanings. In this type of analysis, data are usually collected through surveys, tests, experiments, or questionnaires. The numbers are arranged in tables, charts, or graphs to make them easy to understand. Mathematical and statistical methods are used to analyze the data accurately. This helps researchers compare results and see relationships between variables. Overall, quantitative data analysis helps in making objective and reliable conclusions.

### **Answer to Check Your Progress 2**

The main purpose of quantitative data analysis is to understand numerical information clearly and accurately. It helps researchers find patterns, trends, and relationships in data collected in numbers. Through this analysis, large amounts of data can be summarized in a simple form. It allows comparison between different groups or variables in a scientific way. Quantitative data analysis also helps in testing hypotheses and answering research questions. Because it is based on numbers, the results are more objective and reliable. Overall, its purpose is to draw clear and valid conclusions from numerical data.

**Answer to Check Your Progress 3 - True**

**Answer to Check Your Progress 4 – True**

**Answer to Check Your Progress 5 – True**

---x---

**BLOCK: 5**  
**RESEARCH REPORT**

**Unit 1: The Research Report**

## UNIT-1

### THE RESEARCH REPORT

#### **Unit Structure:**

- 1.1 Introduction
- 1.2 Objectives
- 1.3 Format of Research Report
- 1.4 Precautions for Writing Research Reports
- 1.5 Written and Oral Reports
- 1.6 Guidelines for an Effective Written Report
- 1.7 Principles of Writing a Report
- 1.8 Different formats of written reports
- 1.9 Oral Report
- 1.10 Advantages of Oral Reports
- 1.11 Disadvantages of Oral Reports
- 1.12 Principles of Oral Reports
- 1.13 Summing Up
- 1.14 Questions and Exercises
- 1.15 References and Suggested Readings

#### **1.1 Introduction**

In simple terms, a research report means a written document, which describes the findings of some individual or a group of individuals. It gives an account of something seen, heard, done, etc. The findings may comprise such information like data, surveys, resolutions or policies, on which the concerned individual or individuals have to submit their reports about the proceedings along with the relevant conclusions.

The preparation and presentation of a research report is the most important part of the research process. No matter how well designed the research study is, it is of little value, unless communicated effectively to others in the form of a research report. Moreover, if the report is confusing or poorly written, then the time and effort spent on gathering and analysing data would be wasted. It is therefore, essential to summarize and communicate the

result to the management of an organization with the help of an understandable and logical research report.

Research reports are helpful during the research study, in the sense that they facilitate maintenance of vast data in a logical way. Thus, in case the researcher experiences any difficulty during the course of the study, it becomes easier to refer to the contents of the report to get the relevant data. Research report writing essentially involves systematic arrangement of data. This helps in discovering flaws in reasoning, which may have been missed earlier while conducting a research.

## 1.2 Objectives

After going through this unit you are able to—

- *understand* the Format of Research Report;
- *identify* various Precautions for Writing Research Reports;
- *know* the guidelines for an Effective Written Report;
- *explain* the advantages and disadvantages of Oral Reports.

## 1.3 Format of Research Report

The layout of the research report is of utmost importance because the reader should be able to grasp logically, what has been said and not feel lost in the bulk findings mentioned in the research. This requires preparing a proper layout of the report. Report layout means allotting the research findings in a comprehensible format. The layout should contain the following points:

- **Preliminary pages:** In the preliminary pages, the report should carry a 'title' and a 'date', followed by acknowledgements in the form of 'Preface' or 'Foreword". The 'Table of Contents' should come next, followed by a 'list of tables and illustrations'. This entails the reader to an easy reading and quick location of the required information.
- **Main text:** The main text comprises the complete outline of the research report with all the details. The title of the research study is repeated at the top of the first page of

the main text and then followed with the other details on the pages numbered consecutively, beginning with the second page. The main text can be classified into the following sections:

- **Introduction:** The purpose of introduction is to introduce the research projects to the readers. It should clearly state the objectives of research, i.e., it should make clear, why the problem was considered worth investigating. A brief summary of other relevant research can be included as well, to enable the reader to see the present study in that context.
- **Methodology used for performing the study:** The introduction should contain answers to questions like how was the study carried out, what was the basic design, what were the experimental directions, what questions were asked in the questionnaires used, etc. Besides this, the scope and limitations of the study must be marked out.
- **Statement of findings and recommendations:** The research report should comprise a statement of findings and recommendations in a non-technical language so that it is easily comprehensible.
- **Results:** A detailed presentation of the findings of the study, with supporting data in tabular forms along with the validation of results, should be given. This section should contain statistical summaries and deductions of the data rather than the raw data. There should be a logical sequence and sectional presentation of the results.
- **Implications of the result:** The researcher should write down his/her results clearly and precisely, again at the end of the main text. The implications derived from the results of the research study should be stated in the research plan. The report should also mention the conclusion drawn from the study, which should be clearly related to the hypothesis stated in the introductory section.
- **Summary:** The next step is to conclude the report with a short summary, mentioning in brief the research problem, the methodology, the major findings and the major conclusions drawn from the research results.
- **End matter:** The end of the research report should consist of appendices, listed in respect of all technical data such as questionnaires, sample

information and mathematical derivations. The bibliography of the referred sources and an index should also be given.

### **STOP TO CONSIDER**

Research report means a written document, which describes the findings of some individual or a group of individuals. It gives an account of something seen, heard, done, etc. The findings may comprise such information like data, surveys, resolutions or policies, on which the concerned individual or individuals have to submit their reports about the proceedings along with the relevant conclusions.

#### **1.4 Precautions for Writing Research Reports**

A research report is the means of conveying the research study to a specific target audience. The following precautions should be taken while preparing the research report:

- It should be long enough to cover the subject and short enough to preserve interest.
- It should not be dull and complicated.
- It should be simple, without the usage of abstract terms and technical jargons.
- It should offer ready availability of findings with the help of charts, tables and graphs, as readers prefer quick knowledge of main findings.
- The layout of the report should be in accordance with the objective of the research study.
- There should be no grammatical errors and writing should adhere to techniques of report writing in case of quotations, footnotes and documentations.
- It should be original, intellectual and contribute to the solution of a problem or add knowledge to the concerned field.
- Appendices should be listed with respect to all the technical data in the report.
- It should be attractive, neat and clean, whether handwritten or typed.
- The report writer should be careful about the possessive form of the word "it is" with 'it's'. The correct possessive form of 'it's' is 'its'. The use of 'it is' is the contractive form of it is.
- A report should not have contractions. Examples are "didn't" or 'it's". In report writing, it is best to use the non-contractive form. Hence, the examples would be replaced by

'did not' and 'it is". Using 'Figure' instead of 'Fig.' and 'Table' instead of "Tab." will spare the reader of having to translate the abbreviations, while reading. If abbreviations are used, use them consistently throughout the report. For example, do not switch between 'versus' and 'vs'

- It is advisable to avoid using the word 'very' and other such words that try to embellish a description. They do not add any extra meaning and, therefore, should be dropped.
- Repetition hampers lucidity. The report writer must avoid repeating the same word more than once within a sentence.
- When using the words 'this' or 'these', it must be clear to the reader as to what is being referred to. This reduces ambiguity in the writing and helps to tie sentences together.
- Do not use the word "they' to refer to a singular person. You can either rewrite the sentence to avoid needing such a reference or use the singular 'he or she."

**Self-Assessment Question:**

1. Write any five Precautions for Writing Research Reports?

.....

.....

.....

### **1.5 Written and Oral Reports**

A written report plays a vital role in every business operation. The manner in which an organization writes business letters and business reports creates an impression of its standard. Therefore, the organization should emphasize on the improvement of writing skills of the employees in order to maintain effective relations with their customers.

Writing effective written report requires a lot of hard work. Therefore, before you begin writing, it is important to know the objective, i.e., the purpose of writing, collection and organization of required data.

## 1.6 Guidelines for an Effective Written Report

Writing a report is the best way to communicate, and often the only way to convey one's ideas to others. Thus, it is necessary that the writing should be effective. To improve the effectiveness of writing a report, following are the important points that should be kept in mind:

- Take breaks in between writing, since this gives you the time to incubate the ideas.
- Start writing a short manuscript first, and later on, the detailed one. Create an outline and organize the complete work.
- Make a checklist of the important points that are necessary to be covered in the manuscript.
- Focus on one objective at a time.
- Use dictionary and relevant reference materials as and when required.

## 1.7 Principles of Writing a Report

To write a useful report, it is necessary to follow certain principles. The following are the principles that must be followed while writing a report:

- **Principle of purpose:** A report must have a clear and meaningful purpose that can be converted into an effective management. A clear statement of the purpose helps prepare a well-focussed report on which the management can work. Specification of the purpose is important because:
  - Reports are the analysis of facts and proposals.
  - Reports are the record of a particular business activity.
- **Principle of organization:** A report that is written should be well designed and well ordered. The managerial plan of a report must include the following:
  - ✓ Purpose of report
  - ✓ Information required to be included in the report
  - ✓ Method used to collect report data
  - ✓ Summary of the report
  - ✓ Problems and solutions of the subject mentioned in the report

- ✓ An appendix that describes and confirms the content and conclusion of the report
  
- **Principle of brevity:** Reports should be concise. It is essential because:
  - ✓ Long reports are costly.
  - ✓ Long reports are difficult to examine.
  - ✓ Long reports are prone to disapproval, as they seem insufficient.
  - ✓ Long reports focus on irrelevant minor details that may lead to ignorance of major points.
  
- **Principle of clarity:** Reports should be clear. Clarity can be maintained by using simple language for writing the report. New terms, if any in the report, should be properly explained to avoid confusion.
  
- **Principle of scheduling:** Reports should be prepared at that time when there is no undue burden on the staff or when the staff has sufficient time to prepare reports. However, the time period between the gathering of data and generating finished reports should not be long; otherwise, the report may become outdated and useless if it is not completed in time.
  
- **Principle of cost:** While preparing reports, it is necessary that the cost-benefit analysis of the report should be done. A report should be minimum at costs and maximum at benefits. If the cost of preparation of the report is high but its benefit is low, then it is not advisable to prepare that report.

### **1.8 Different formats of written reports**

A written report can be written in various formats, which are as follows:

**Straight-line format:** This format is used when the information is to be presented in alphabetical, sequential or numerical orders. This format is used to generate descriptive reports.

**Building blocks format:** This format is used when the information presented leads to some conclusion. The report in this format starts with a brief introduction, contains some logical facts and finally the conclusions and recommendations.

**Inverted pyramid format:** The report in this format has the most important item at the top, and the least important item at the bottom of the report. That is, items are listed in the descending order with the most important item at the top. This style of writing or format is also known as journalistic style or format.

### **1.9 Oral Report**

At times, oral presentation of the results that are drawn out of research is considered effective, particularly in cases where policy recommendations are to be made. This approach proves beneficial because it provides a medium of interaction between a listener and a speaker. This leads to a better understanding of the findings and their implications. However, the main drawback of oral presentation is lack of any permanent records related to the research. Oral presentation of the report is also effective when it is supported by various visual devices, such as slides, wall charts and white boards that help in better understanding of the research reports.

### **1.10 Advantages of Oral Reports**

Oral reports help in direct communication without any delay. The following are some of the advantages of an oral report:

- It provides immediate feedback to the participants of the oral report. Moreover, participants can also ask for further clarification, elaboration and justifications.
- It is time saving.
- It helps develop relationship among employees by building healthy atmosphere in an organization.
- It is an effective tool of persuasion in business.
- It is economical as it saves large amount of money spent on stationery.

- It provides the speaker with the opportunity to correct and make himself/herself clear on the spot.
- It helps speakers to immediately understand the reaction of the group that they are addressing.

### **1.11 Disadvantages of Oral Reports**

There are many disadvantages of oral reports, which are:

- Oral reports may not always be time saving. Sometimes, the meeting between the speaker and the listener can continue for a very long time without any satisfactory conclusion.
- A listener of the oral report cannot always retain the entire message.
- The messages in the oral reports do not have any legal validity as they are not documented.
- Oral reports may sometimes be misleading, if the thoughts of the speaker are not organized carefully.
- Lengthy oral messages may sometimes cause problems.

### **1.12 Principles of Oral Reports**

Oral reports should follow some principles in order to make communication of the oral report between the speaker and the listener effective. The following are the basic principles of oral reports:

- It is the responsibility of a manager to inform his subordinates about the tasks that they have to perform.
- To obtain full commitment of employees for achieving their objectives, all important information that directly or indirectly affects the objective should be communicated to the employees. Also, employees should be aware of the matters that are relevant to their circumstances.
- It is the duty of a manager to see that the information of the report communicated to the subordinates is clear to them and is complete.
- Proper planning for information flow should be done.
- The information in the oral report should provide proper feedback that helps maintain effective industrial relation.

### 1.13 Summing Up

- The research process involves preparation of a research report to explain the hypothesis. This is done by logical analysis of the subject, preparation of the rough draft and then making the final draft of the hypothesis.
- A report must have a clear and meaningful purpose that can be converted into an effective management. A clear statement of the purpose helps prepare a well-focused report on which the management can work.
- According to the objective and nature of the research, the layout of the report should be decided and followed in a proper manner.
- A written report should be clear, specific and convincing in order to be effective. While writing, you should avoid ambiguity and follow a friendly, lively, pleasant and sophisticated style of writing.
- An oral report facilitates direct communication without any delay. It is time saving and also provides immediate feedback to the participants.
- Writing interpretive reports is different from writing an informational report because it contains different elements.

### 1.14 Questions and Exercises

#### Short-Answer Questions:

1. Mention the steps involved in the report writing process.
2. Write a note on oral presentation.
3. What do you mean by informational report?
4. List the precautions that need to be taken while writing a research report.

#### Long-Answer Questions:

1. Discuss the importance of research proposal and research process in research report writing.
2. Explain the significance of a research report.
3. Explain the layout of a research report,
4. Give a detailed account on the mechanics of report writing
5. Discuss the guidelines that must be followed while preparing a written report.

### 1.15 References and Suggested Readings

- Ary, Donald, Lucy Cheser Jacobs and Asghar Razavich. 1979. Introduction to Research in Education. New York: Holt, Rinehart and Winston.
- Best, J. W. and James V. Kahn. 1992. Research in Education, Indian Edition. New Delhi: Prentice Hall of India Pvt. Ltd.
- Bhattacharya, D. K. 2003. Research Methodology. New Delhi: Excel Books.
- Kerlinger, F. N. 1993. Foundations of Behavioural Research: Educational and Psychological Inquiry. New York: Holt, Rinehart and Winston.
- Koul, Lokesh. 1997. Methodology of Educational Research, Third Revised Edition New Delhi: Vikas Publishing House Pvt. Ltd.
- Kothari, C.R. 2004, Research Methodology: Methods and Techniques. New Delhi New Age International Publishers.

---x---