Research Methodology Demystified

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RESEARCH METHODOLOGY

Research methodology is a theoretically grounded, well-articulated approach to data generation. It alludes to the research and evaluation of data generation methods. People's decision about research methodologies is influenced by their "strategy, plan of action, process, or design" (Crotty, 2020). It is focused on the topic of how a specific research project should be carried out. It assists the researcher in determining the kind of data needed for a study and the most suitable data-gathering methods to achieve that study's objectives. The methodological query prompts the researcher to inquire about the best way to study the world.

The primary objective of research methodology is to ensure that the research is conducted rigorously, logically, and reliably, allowing for the generation of valid and credible results. Research methodology has components that can be associated with those of a tree. Study figure 1 to understand the research methodology from a paradigm perspective.

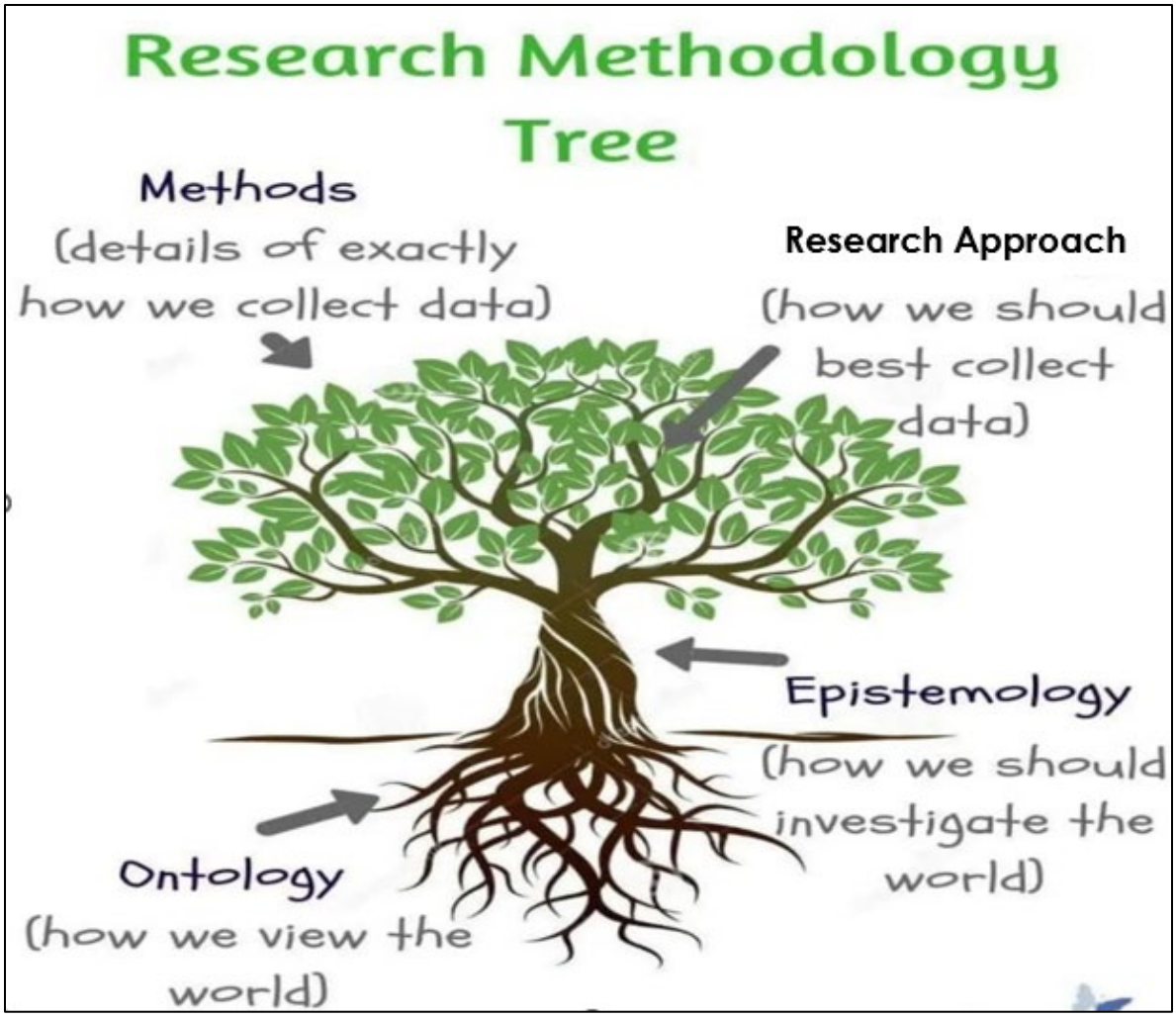

Figure 1: Research Methodology Tree

Figure 1 shows that worldviews are the anchors of research methodology. The figure depicts ontology as the roots that show us how we view the world, while epistemology is the stem that guides us on how we should investigate the world.

Research methodology encompasses several key components:

1. Research paradigm: It refers to a framework or perspective that guides how researchers conduct their studies and approach their research questions. It encompasses a set of beliefs, assumptions, and methodologies that shape the overall approach to research within a particular discipline or field of study.
2. Research type: It depends on the objectives and methodology of the study.

3. Research approach: It is the systematic method or strategy used to investigate a research question or problem. It outlines the steps and procedures that will be followed to gather data, analyse information, and draw conclusions.
4. Research design: This involves selecting an appropriate framework for the study, such as experimental, correlational, descriptive, or qualitative research design. The research design determines how data will be collected and analysed.
5. Data collection: Researchers collect data through various methods, such as surveys, interviews, observations, experiments, or document analysis. The choice of data collection method depends on the research questions, objectives, and the nature of the study.
6. Sampling: Researchers must select a subset of individuals or cases from the target population to gather data. Sampling techniques, such as random, stratified, or convenience, ensure that the sample is representative of and generalisable to the larger population.
7. Data analysis: Once the data is collected, researchers employ various analytical techniques to organise, interpret, and conclude the data. Quantitative studies typically involve statistical analysis, while qualitative studies focus on thematic, content, or discourse analysis.
8. Ethical considerations: Research methodology emphasises ethical principles to ensure the rights and well-being of participants. Researchers must obtain informed consent, maintain confidentiality, and protect privacy throughout the research process.
9. Validity and reliability: Researchers strive to achieve validity (accuracy and soundness) and reliability (consistency and replicability) in their research findings. Validity ensures that the study measures what it intends to measure, while reliability ensures consistent results over time and across different contexts.
10. Research limitations: Researchers acknowledge and discuss their study's limitations and potential biases. This includes handling any constraints, challenges, or shortcomings that might impact the interpretation and generalisability of the research findings.

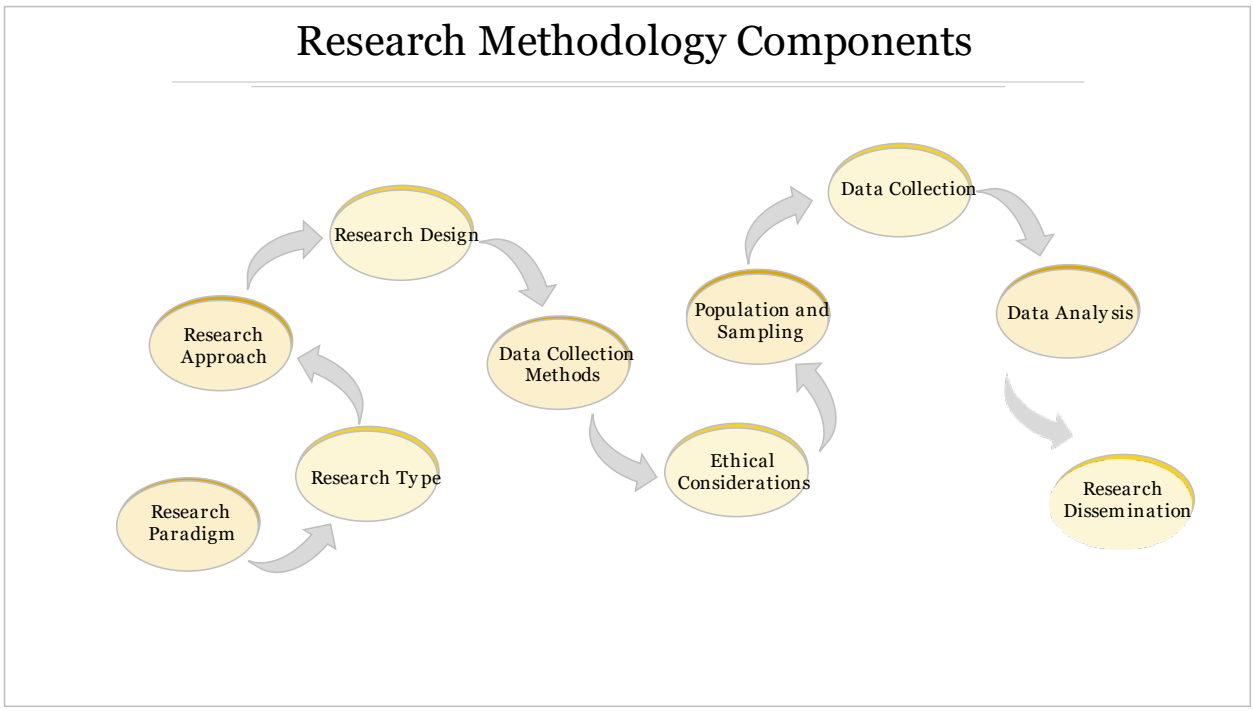

Figure 2: Research Methodology Components

RESEARCH PHILOSOPHIES AND PARADIGMS

- Thomas Kuhn (1962) first used the word “paradigm” to represent a philosophical way of thinking.
- Other definitions include:

  - A set of beliefs that represents a worldview (Guba & Lincoln, 1994)

  - A mental model or a framework of thought or belief through which one interprets reality
- Researchers' philosophical orientation, which decides research approach and methods to be used in a study are ontology, epistemology and axiology.

Ontology

- The word *ontology* is derived from the Greek words “ontos”, which means being, and “logos”, which means study.
- Therefore, it the study of being.
- Ontology is the beginning of any research, after which epistemology, methodology and methods follow.

- Ontological assumptions are concerned with the form and the nature of reality and being and what can be known about that reality (Ponterotto, 2005; Guba & Lincoln, 1994).

Epistemology

- The branch of study that deals with different methods of knowing is called *epistemology*. The most important branch of philosophy deals with questions such as: *How do we come to know something?*
- Is knowledge acquired, or does one need to experience it personally?
- What is the relationship between the researcher and those who are researched? (Kivunja & Kuyini, 2017)
- Epistemological assumptions concern how knowledge can be created, acquired, and transferred (Scotland, 2012).
- It is responsible for knowledge gathering and is concerned with developing new knowledge in the form of new models or theories (Grix, 2002).

Axiology

- Constructivists assert that since reality is mind-constructed and mind-dependent and knowledge is subjective, social inquiry is value-bound and value-laden.
- You are inevitably influenced by your values, which inform the paradigm you choose for inquiry, the topic you study, the methods you choose to collect and analyse data, how you interpret the findings and the way you report the findings.
- As a constructivist researcher, you admit the value-laden nature of the study and report your values and biases related to the topic under study that may interfere with neutrality.

FIVE COMMON PARADIGMS

There are several research paradigms, each with its underlying principles and methods. The most common research paradigms are explained in the following subsections.

Positivist paradigm

The positivist paradigm emphasises using scientific methods and objective measurement to understand social and natural phenomena. It assumes that objective reality can be studied through systematic observation and experimentation. This paradigm often employs quantitative research methods like surveys, experiments, and statistical analysis. Research in this paradigm aims to prove or disprove a hypothesis. Characteristics of positivist research include an emphasis on the scientific method, statistical analysis, and generalisable findings. They also have a control group and an experimental group and a pre/test post-method. The term *positivism* was first coined by the founder of positivism, Auguste Comte, the French philosopher who believed that reality can be observed. Cohen, Manion, and Morrison (2007) claim that Comte's position was to lead to a general doctrine of positivism which held that all genuine knowledge is based on sense of experience and can be advanced only by employing observation and experiment. The following philosophers unpacked the positivist paradigm differently, as shown in Table 1.

Table 1: Positivist Philosophers

Philosopher	Philosophy
Aristotle	Deductive reasoning
Descartes	Realism
Galileo	Scientific method
Auguste Comte	Positivism
The Vienna Circle	Local positivism
Francis Bacon	Inductive reasoning
Karl Popper	Postpositivist

Table 2: Ontological and Epistemological Assumptions of Positivism

Ontological assumptions	Epistemological assumptions
Reality is external to the researcher and represented by objects in space	The methodology of the natural sciences should be employed to study social reality (Grix, 2004: 64).
Objects have meaning independently of any consciousness of them	Truth can be attained because knowledge rests on a set of firm, unquestionable, indisputable truths from which our beliefs may be deduced (Grix, 2004: 64).
Reality can be captured by our senses, and be predicted	Knowledge is generated deductively from a theory or hypothesis. Knowledge is objective.

Postpositivism

The positivist paradigm has come under fire for using the scientific approach to study human concerns. These critics contended that the classroom, where teachers and students manufacture meaning, cannot be a place where uniform causal relationships are made, as they may be in studying natural science.

- Karl Popper argued that we should not be too quick to disregard all the good qualities of the scientific method. Instead, we can make minor adjustments that can be improved upon to provide objective research within the social sciences. Popper declares that there are no absolute truths.
- Today, a positivist "claims a certain level of objectivity rather than absolute objectivity and seeks to approximate the truth rather than aspiring to grasp it in its totality or essence" (Crotty, 2020).
- When people refer to themselves as positivists, they talk more about probability than absolute certainty.

Interpretivist paradigm

The interpretive paradigm focuses on understanding individuals' subjective meanings and interpretations of their experiences. It recognises that reality is socially constructed and emphasises the importance of context, language and culture in shaping human behaviour. Qualitative research methods, such as interviews, observations, and textual analysis, are commonly used within this paradigm. The interpretivist paradigm can also be called the "anti-positivist" paradigm as it was developed as a reaction to positivism. It is also sometimes referred to as constructivism because it emphasises the ability of the individual to construct meaning. The interpretivist paradigm is heavily influenced by hermeneutics phenomenology. People see reality and interpret events differently, resulting in multiple perspectives of an incident. Philosophers associated with interpretivism are presented in table 4.

Table 4: Philosophers – interpretive paradigm

Philosopher	Philosophy
Edmund Husserl, Arthur Schultz	Phenomenology
Descartes	Realism
Wilhelm Dilthey, Han-Georg Gadamer	Hermeneutics
Herbert Blumer	Symbolic interaction
Harold Garfinkel	Ethnomethodology

Table 5: Ontological and Epistemological Assumptions of Interpretivism

Ontological assumptions	Epistemological assumptions
Reality is indirectly constructed based on individual interpretation and is subjective.	Knowledge is gained through a strategy that "respects the differences between people and the objects of natural sciences and therefore requires the social scientist to grasp the subjective meaning of social action" (Grix, 2004: 64).

Ontological assumptions	Epistemological assumptions
People interpret and create their own meaning of events	Knowledge is gained inductively to create a theory.
There are multiple perspectives on one incident	Knowledge is generated deductively from a theory or hypothesis.
Causation in social sciences is determined by interpreted meanings and symbols.	• Knowledge arises from particular situations and is not reducible to simplistic interpretation. • Knowledge is gained through personal experience.

Transformative/critical paradigm

The critical paradigm is rooted in social and political theory and seeks to uncover societal power structures, inequalities, and injustices. It aims to challenge existing power relations and to promote social change. Critical researchers often use qualitative research methods, such as critical discourse analysis and participatory research, to explore and critique social structures and systems. The critical paradigm stems from critical theory and the belief that research is conducted for "the emancipation of individuals and groups in an egalitarian society" (Cohen et al., 2007: 26). The critical educational researcher aims not only to understand or give an account of societal behaviours but also to change these behaviours. The critical paradigm embodies different ideologies, such as postmodernism, neo-Marxism and feminism. Table 6 presents the critical philosophers:

Table 6: Critical Philosophers

Philosopher(s)	Philosophy
Theodor Adorno, Max Horkheimer, Herbert Marcuse	Frankfurt School and Critical Theory (1930s)
“Erich Fromm	Critical Theory (1970s)
Karl-Otto Apel, Jürgen Habermas	Critical Pedagogy

Philosopher(s)	Philosophy
Paulo Freire	Structuralism
Michel Foucault	Critical Applied Linguistics
Alastair Pennycook	Critical Discourse Analysis
Norman Fairclough	Queer theory
Eve Kosofsky Sedgwick, Judith Butler	Feminism
Simone de Beauvoir, Betty Friedan	Postmodernism
Thomas Kuhn, Jacques Derrida	Deconstruction

Table 7: Ontological and Epistemological Assumptions of Critical Philosophers

Ontological assumptions	Epistemological assumptions
Persons in society define social reality.	Knowledge is socially constructed through media, institutions and society.
Social reality is socially constructed through media, institutions and society.	What counts as worthwhile knowledge is determined by the social and positional power of the advocates of that knowledge" (Cohen et al., 2007: 27).
Social behaviour is the outcome of "particular illegitimate, dominatory and repressive factors, illegitimate in the sense that they do not operate in general interest – one person's or group's freedom and power is bought at the price of another's freedom and power" (Cohen et al., 2007: p 26)	Knowledge is produced by power and is a network of “force relations”.

Pragmatism

Pragmatism is a research paradigm founded on the idea that researchers should employ the philosophical and methodological approach that is most effective for the research problem they are examining.

It is frequently linked to mixed-methods or multiple-methods research, where the focus is on the research outcomes and questions rather than on the methods. Both formal and informal rhetoric could be used. The pragmatist scholars reject the idea that social science research can only access reality by utilising one scientific approach.

Pragmatism Philosophers

Philosophers	Philosophies
Robert T. Craig	Communication Theory, Social Constructionism
Karl-Otto Apel	Transcendental Pragmatics
Paulo Freire	Critical Pedagogy
John Dewey	Rational Empiricism
George H. Mead	Social Psychology
W.V. Quine	Analytic Philosophy
C.I. Lewis	Philosophical Logic

Figure 3 summarises the research paradigms discussed in this resource.

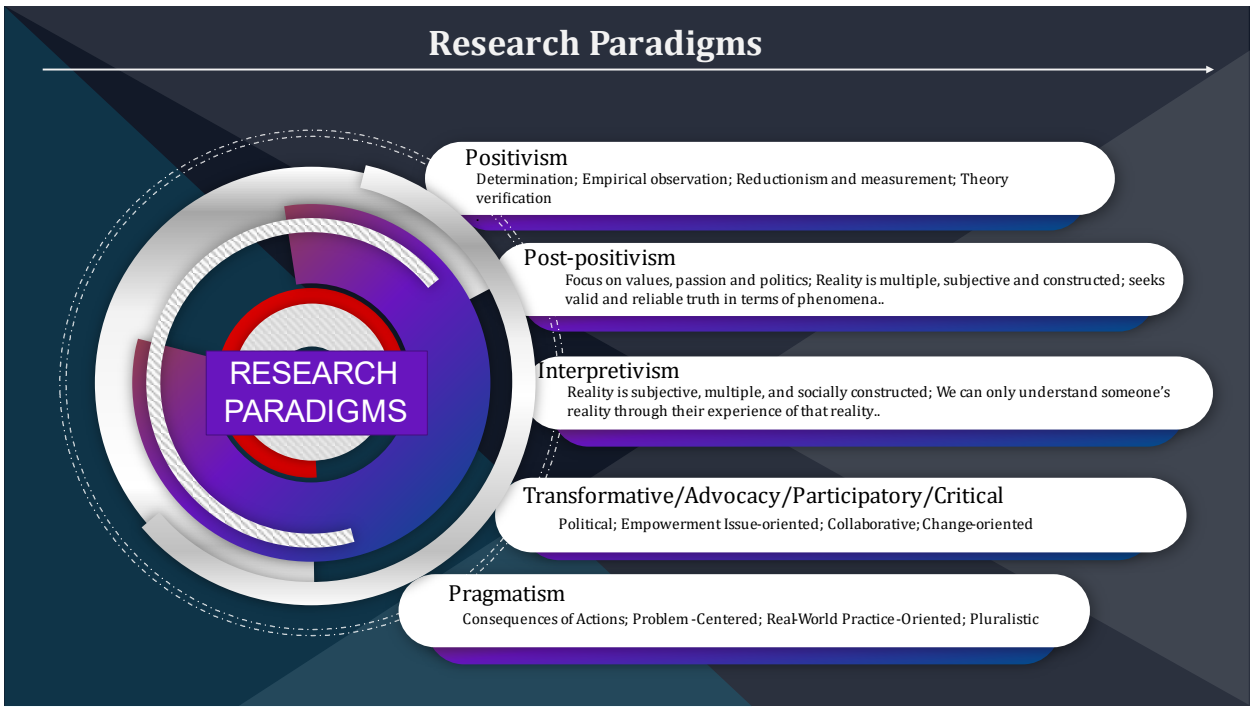

Figure 3: Research Paradigms

It is important to note that these paradigms are not mutually exclusive, and researchers may draw upon multiple paradigms or employ a mixed-methods approach depending on their research questions and goals. The choice of research paradigm depends on the nature of the research topic, the disciplinary traditions, and the researcher's perspectives and values.

Recently, other authors, such as Creswell (2018), established more paradigms, which are summarised in Table 8:

Table 8: Research Paradigms' link with Methodology

Paradigm	**Ontology** *(What is reality?)*	**Epistemology** *(How do I know reality?)*	**Methodology** *(How do I go about finding out?)*	**Method** *(What techniques should I use to find out?)*
Positivism	There is only one single truth	Reality can be measured, and there are reliable	- Experimental research - Survey design	Usually, quantitative may include:

		and valid tools to do this		- Measurement & scaling Statistical analysis Seldom quantitative and may use: - Focus group interviews
Constructivism/ Interpretivism	There is no single reality or truth. Individuals create reality in groups	Therefore, reality needs to be interpreted in order to uncover the underlying meaning of events, activities and behaviours	- Ethnography - Grounded theory - Phenomenological research - Heuristic inquiry - Action research - Discourse analysis - Feminist standpoint	Usually, qualitative may include the following: − Interviews − Observation (researcher as participant/non-participant) − Case study − Life history − Narrative − Theme identification
Pragmatism	Reality is constantly renegotiated, debated, and re-interpreted in light of its usefulness in new situations	The best method is one that solves the problem. Finding out is the means to change the underlying goal	- Mixed methods - Design-based research - Action research	Combination of any of the above, as well as data mining, usability testing, physical prototypes
Transformative/ Subjectivism	Reality is what we perceive to be real	All knowledge is purely a matter of perspective	- Discourse theory - Archaeology - Anthropology - Genealogy - Deconstruction	- Auto-ethnography - Semiotics - Literary analysis - Pastiche - Intertextuality
Critical Realism	Realities (plural) are socially constructed under the constant internal influence	Reality and knowledge are both socially constructed by power relations within society	- Critical discourse analysis - Critical ethnography - Action research - Ideology critique	- Ideological review - Civil actions - Open-ended interviews - Questionnaires/ observations - Journals

RESEARCH TYPES

Research can be categorised into various types based on different criteria. In this lesson, we share some of the types.

1. Basic research: Basic research, also known as pure or fundamental research, aims to expand knowledge and understanding in a particular field without any immediate practical application. It focuses on theoretical principles and concepts.

2. Applied research: Applied research is conducted to solve specific problems or deal with practical issues. It utilises basic research findings to develop practical applications, products, or solutions. Applied research is often carried out in medicine, engineering, and technology.

3. Experimental research: Experimental research involves the manipulation of variables in a controlled setting to determine cause-and-effect relationships. It typically includes the random assignment of participants to different experimental conditions and the measurement of outcomes.

4. Observational research: Observational research involves observing and documenting phenomena in their natural settings without intervening or manipulating variables. It can include methods like naturalistic observation, participant observation, and archival research.

5. Cross-sectional research: Cross-sectional research involves collecting data from a sample of individuals or entities at a specific time. It provides a snapshot of a population or phenomenon and is often used to study prevalence, correlations, or associations.

6. Longitudinal research: Longitudinal research follows the same individuals or entities over an extended period. It allows researchers to examine changes, developments and trends over time and to understand causal relationships better.

7. Descriptive research: Descriptive research is a type of research that outlines the features of the population or issues under study. This type of research focuses more on the "what" of the research problem than the "why." Since the researcher cannot influence the variables in this research design, he/she can only report the facts precisely as they occurred or are occurring. The primary methods used in descriptive research include observations, surveys, and case studies. One can use many variables in descriptive research to explain the facts. Its advantages include a) being effective at analysing topics and issues that cannot rely on numbers, b) being observable in an unaltered natural environment, and c) taking less time than quantitative experiments.

8. Analytical research: Analytical research uses proven facts to form the basis for the research. Researchers frequently do research to find supporting data that strengthens and authenticates their earlier findings. Also, it helps to develop new concepts related to the research subject. Hence, analytical research combines minute details to produce more tenable hypotheses. The analytical study thus explains why a claim is valid.

   There are various ways to conduct this research, including meta-analysis, literary or scientific trials, and learning about public opinion. Moreover, the researcher carries out a critical evaluation of the material in this method. Analytical methods also often make use of quantitative methods.

9. Fundamental research: Formulating a theory and generalisations are the primary concerns of fundamental research. It seeks to discover facts with various applications, supplementing the ideas already known in a specific field or industry. Several domains are connected, aiming to discover how one can change traditional things or develop something new. One can find the summary in everyday language and apply logical findings in the research. Research on generalising human behaviour and research on pure mathematics are examples of fundamental research.

10. Exploratory research: Theories and their explanation are the basis of exploratory research. Its goal is only to investigate the study questions, not to provide

definitive and conclusive solutions to current problems. Exploratory research seeks to increase our understanding of the issue rather than to offer conclusive evidence. The structure is improper, and the methods offer a flexible and investigative approach. Therefore, one does not test the hypothesis, and the results do not help the outside world. The findings are usually a related topic, which helps to improve the research.

Exploratory research is usually qualitative, but a large-sample exploratory study can also be quantitative. Due to its flexible and open-ended nature, it is often known as interpretive research or a grounded theory approach.

11. Conclusive research: Conclusive research has a straightforward design in the methodology and intends to answer the research question. A well-thought-out structure helps to formulate and solve the hypotheses and gives the results. The results are generic here. Furthermore, it is essential to establish this study's research objectives and data requirements, as conclusive research findings typically have a specific purpose. The results of exploratory studies can be validated and quantified using a conclusive research design. A conclusive research design typically employs quantitative methods of data collection and analysis. In addition, conclusive research frequently takes a deductive research approach.

RESEARCH APPROACHES

Research approaches can be inductive or deductive. A research approach refers to the overarching strategy or method researchers use to conduct their investigations, gather data, and analyse information to answer specific research questions or achieve research objectives. The choice of a research approach depends on the nature of the research, the research questions being investigated, and the available resources. There are several common research approaches, including:

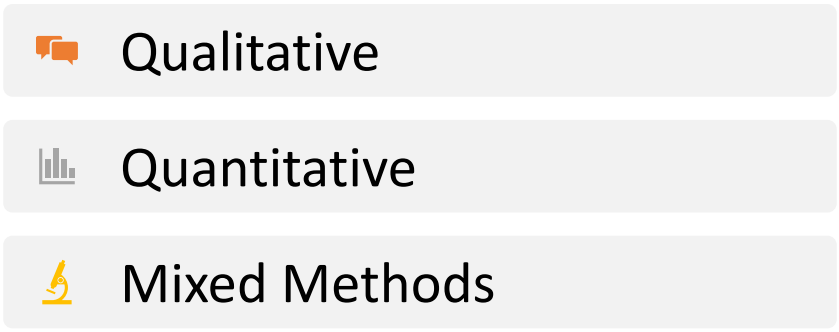

Figure 3: Research Approaches

Qualitative research: Qualitative research involves the collection and analysis of non-numerical data, such as interviews, focus groups, observations, or textual documents. Researchers seek to understand people's experiences, perspectives, and behaviours thoroughly. Qualitative research is often used when exploring complex social phenomena or when quantitative data alone may not provide sufficient insights.

Quantitative research: This approach collects and analyses numerical data to establish patterns, relationships, and statistical significance. Researchers often use surveys, experiments, and structured observations to gather quantitative data. The goal is to draw objective and generalisable conclusions from the data.

Mixed-methods research: This approach combines quantitative and qualitative methods within a single study. Researchers use mixed-methods research to comprehensively understand a research problem by triangulating data from different sources. It can help validate findings and provide a more complete picture of the subject under investigation.

RESEARCH DESIGNS

A research design is a structured and systematic plan or blueprint outlining the overall research study strategy. It serves as a roadmap for how researchers collect, analyse, and interpret data to answer their research questions or achieve their objectives. A well-structured research design ensures the validity, reliability, and generalisability of research findings. It helps researchers make informed decisions about various aspects

of their study. Different research designs are suitable for different research questions and objectives.

Qualitative research designs

The choice of a research design depends on the nature of the research problem and the type of data required to answer the research questions effectively. You should consider the research design carefully to ensure that it aligns with the goals and research context.

Figure 4: Qualitative Research Designs

Narrative

Narrative research refers to qualitative data collected from participants in written, oral or visual form. Meanings are found in the words and phrases used by research participants. Narrative research seeks to explore people's lives using their own words.

Case study

A case study is a research design that can describe each research participant individually according to work, socioeconomic status, special needs, living situation, life story, and so on. It can be a group of people (a university department, a group of students with shared circumstances, a lecturer, etc.) or individual details such as facilities or problems, processes, phenomena or events at a particular facility. There are various case study designs, which are presented in table 9.

Case study	Description	Definition
Explanatory	• It focuses on an explanation for a question or a phenomenon. An explanatory case study is 1 + 1 = 2. The results are not up for interpretation. • A case study with a person or group would not be explanatory, as there will always be variables with humans. There are always slight variances that cannot be explained. • However, even case studies can be explanatory. For example, let us say a particular vehicle has a series of crashes caused by faulty brakes. All of the crashes result from brakes not being effective on icy roads.	This type of case study would be used if you were aiming to answer a question that sought to explain the presumed causal links in real-life interventions that are too complex for the survey or experimental strategies. In evaluation language, the explanations would link programme implementation with programme effects (Yin, 2013)
Exploratory	Exploratory case studies are prevalent in psychology and the social sciences. Psychologists are always looking for better ways to treat their patients, and exploratory studies allow them to research new ideas or theories.	This type of case study is used to explore those situations in which the intervention being evaluated has no clear, single set of outcomes (Yin, 2013).
Intrinsic	An intrinsic case study is the study of a case wherein the subject itself is the primary interest. The "Genie" case is an example of this. The study was not about psychology but about Genie and how her experiences shaped who she was.	Stake (1995) uses the term intrinsic and suggests that researchers who have a genuine interest in the case should use this approach when the intent is to better understand the case. It is not undertaken primarily

		because the case represents other cases or because it illustrates a particular trait or problem, but because in all its particularity and ordinariness, the case itself is of interest. The purpose is NOT to come to understand some abstract construct or generic phenomenon. The purpose is NOT to build theory (although that is an option; Stake, 1995).
Instrumental	An instrumental case study uses a case to gain insight into a phenomenon. For example, a researcher interested in child obesity rates might conduct a study with middle school students and an exercise programme. In this case, the children and the exercise programme are not the focus. The focus is learning the relationship between children and exercise and why certain children become obese.	It is used to accomplish something other than understanding a particular situation. It provides insight into an issue or helps to refine a theory. The case is of secondary interest; it plays a supportive role, facilitating our understanding of something else. The case is often looked at in-depth, its contexts scrutinised, its ordinary activities detailed; because it helps the researcher pursue the external interest. The case may or may not be seen as typical of other cases (Stake, 1995).
Multiple-case studies or collective studies	• Multiple-case or collective studies use information from different studies to formulate the case for a new study. The use of past studies allows additional information without needing to spend more time and money on additional studies. • Using the PTSD issue again is an excellent example of a collective study. When studying what contributes most to wartime	A multiple-case study enables the researcher to explore differences within and between cases. The goal is to replicate findings across cases. Because comparisons will be drawn, it is imperative that the cases are chosen carefully so that the researcher can predict similar results across cases,

	PTSD, a researcher could use case studies from a different war. For instance, studies about PTSD in WW2 vets, Persian Gulf War vets, and Vietnam vets could provide an excellent sampling of which wartime activities are most likely to cause PTSD.	or predict contrasting results based on a theory (Yin, 2013). Collective case studies are similar in nature and description of multiple-case studies (Yin, 2013)

Phenomenology

Phenomenological research seeks to gain deeper insight regarding a particular phenomenon. This outcome is achieved by exploring participants' lived experiences regarding the phenomenon of interest while suspending the researchers' subjective assumptions. Phenomenology is classified into descriptive and interpretive phenomenology. In descriptive phenomenology, the essence of an experience is described. Interpretive phenomenology is also called hermeneutic phenomenology.

Other scholars identified the following phenomenological designs:

- Transcendental phenomenology: It comprises the scientific study of the appearance of things as they are seen and appear in one's consciousness.
- Hermeneutic phenomenology: It focuses on making meaning of experiences as they are lived.
- Existential phenomenology: seeks to develop an in-depth, embodied understanding of human existence. It challenges approaches in psychology and psychiatry that view human beings in a reductionistic manner.

Conducting a phenomenological research methodology pertains to the four necessary steps of bracketing, intuiting, analysing and describing.

Ethnography

Ethnography is an approach that gathers data through observations, interviews and documents. The main aim of ethnography is to understand social phenomena. The ethnographic researcher immerses him/herself in the social setting of the study to

produce rich insights into the lives, customs, practices, and ways of those he/she seeks to know.

Grounded theory

Grounded theory is a means to develop conceptual thinking and theory building; not empirical theory testing. The grounded theory's literature review and research questions support conceptual thinking and theory building.

Quantitative research designs

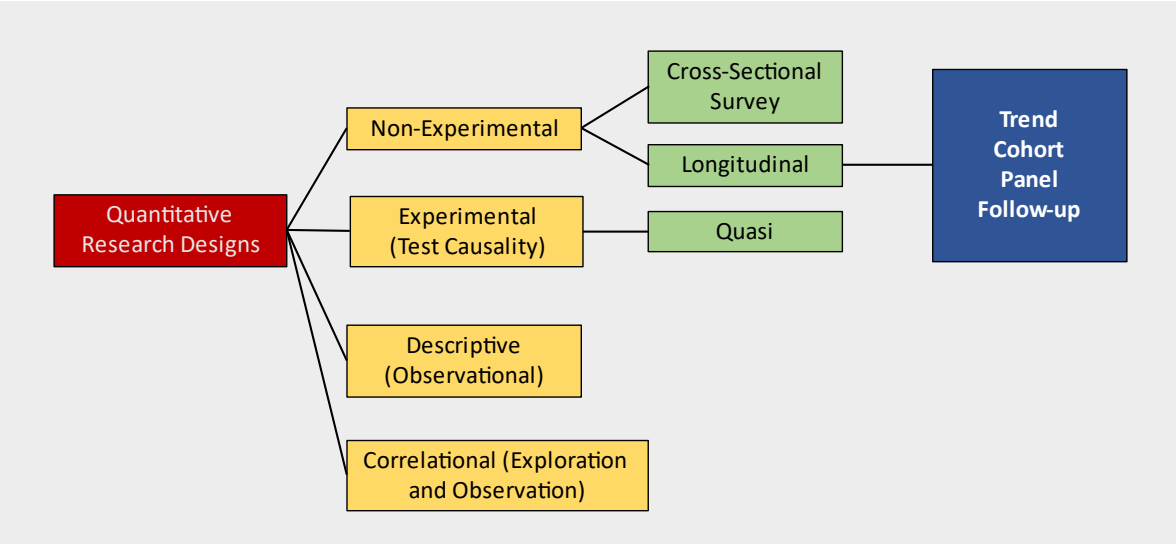

Figure 5: Quantitative Research Designs

Non-experimental designs

Unlike the experimental research design, a non-experimental design does not progress based on independent variables, dependent variables or their cause-and-effect relationships. The non-experimental study depends on the variables that are out of the scope of the researcher's control.

Cross-sectional survey

Cross-sectional approaches involve using different groups of people who are different with regard to the variable of interest but similar in other characteristics such as socioeconomic status, race, educational background, and so forth. The studies are observational and study different groups at the same time.

Longitudinal study

Longitudinal studies involve the observation of a variable over a (usually) extended period.

Experimental designs

Experimental designs use the principle of manipulating the independent variables and examining their cause-and-effect relationship with the dependent variables by controlling the effects of other variables. Usually, the experimenter assigns two or more groups with similar characteristics. Different interventions will be given to the groups. If there are differences in the outcomes among the groups, the experimenter can conclude that the differences result from the interventions the experimenter performed (Frey, 2018).

Quasi

Quasi-experiments are carried out to determine a cause-and-effect relationship between an independent and a dependent variable.

Descriptive designs

Descriptive research describes the characteristics of a population or phenomenon being studied. It does not answer questions about how/when/why the characteristics occurred. It focuses on the "what" question (what are the characteristics of the population or situation being studied?) (Shields & Rangarajan, 2013).

Correlational designs

Correlational research designs are non-experimental and seek to establish the relationship between two variables. This design is done with no manipulation or control of the variables.

Mixed-methods designs

The mixed-methods research design combines the strengths of the quantitative and qualitative approaches to answer the research questions.

Sequential-exploratory

In sequential-exploratory research designs, the researcher begins with a qualitative research phase and explores participants' views. The quantitative phase follows the qualitative phase of the study, and data are analysed and integrated to answer the research question and hypothesis.

Sequential-explanatory

The sequential-explanatory design was adopted to merge and mix different datasets to be collected and analysed (Othman et al., 2020).

Embedded

In an embedded mixed-methods design, the qualitative data set is embedded within and supports the quantitative data. Alternatively, a qualitative method may be used as the primary method and a survey method as the embedded research approach (Yu & Khazanchi, 2017.)

Concurrent triangulation

Using a triangulation technique, the researcher gathers quantitative and qualitative data at predetermined locations (Mphahlele, 2018). Then, data are contrasted to spot overlaps, discrepancies, gaps, and unsolved questions.

Concurrent-nested

Quantitative and qualitative data are collected simultaneously; however, one method is "nested" or "embedded" in the other. The secondary research method is subsumed by the primary one and deals with secondary research questions.

Sequential-transformative

Suitable for complex research projects, sequential-transformative mixed methods are an iterative, cyclical design. In this design, prototypes can be developed and tested, and each step's evaluation results can be used to inform the next. Figure 5 gives a view of the mixed-method designs.

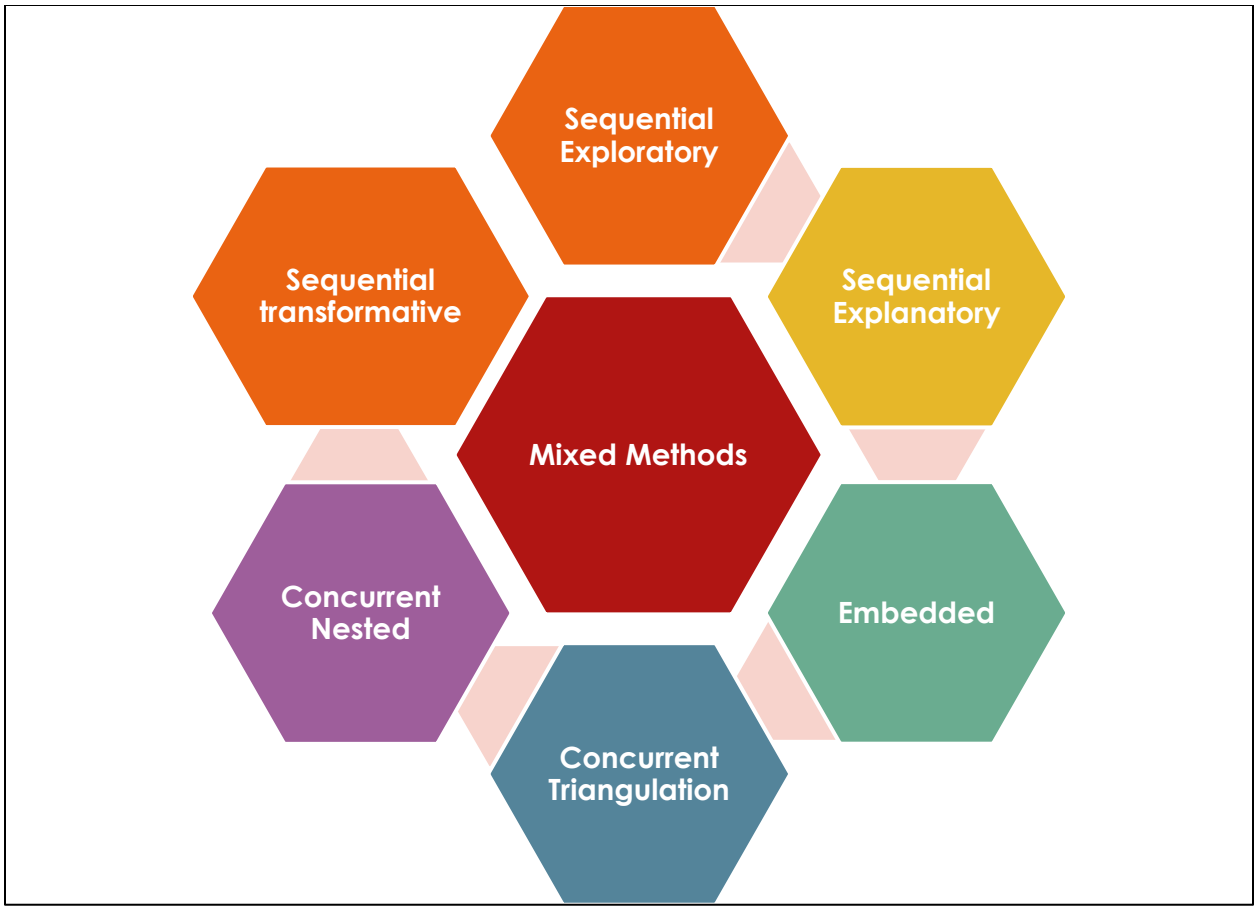

Figure 6: Mixed-methods Designs

Please read more on the designs and select one that you may use for your study.

CONCLUSION

This resource has covered the main features and components of research methodologies. The research paradigms that reflect the researchers' belief systems and the research approaches have been explained and the various research types, research approaches and research designs have been discussed in this resource. We encourage you to read further about the type of research you may wish to use and its relevance for the research approach and design.

References

Cohen, L., Manion, L., & Morrison, K. (2007). *Research Methods in Education* (6th ed.). Routledge.

Creswell, J. W., & Creswell, J. D. (2018). Research design: *Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE.

Crotty, M. (2020). *The foundations of social research*. Routledge. https://doi.org/10.4324/9781003115700

Frey, B. B. (2018). The SAGE Encyclopedia of Educational Research, Measurement, and Evaluation. SAGE Publications, Inc. https://doi.org/10.4135/9781506326139

Grix, J. (2002). Introducing Students to the Generic Terminology of Social Research. *Politics*, 22(3), 175–186. https://doi.org/10.1111/1467-9256.00173

Grix, J. (2004). *The Foundations of Research*. Palgrave Macmillan.

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), Handbook of Qualitative Research (pp. 105–117). Sage Publications.

Kivunja, C., & Kuyini, A. B. (2017). Understanding and Applying Research Paradigms in Educational Contexts. *International Journal of Higher Education*, 6(5), 26. https://doi.org/10.5430/ijhe.v6n5p26

Mphahlele, R. S. S. (2018). Information Communication Technologies as a support mechanism for learners experiencing reading difficulties in Full-Service Schools [Doctoral Thesis]. University of South Africa.

Othman, S., Steen, M., & Fleet, J.-A. (2020). A sequential explanatory mixed methods study design: An example of how to integrate data in a midwifery research project. *Journal of Nursing Education and Practice*, 11(2), 75. https://doi.org/10.5430/jnep.v11n2p75

Ponterotto, J. G. (2005). Qualitative research in counseling psychology: A primer on research paradigms and philosophy of science. *Journal of Counseling Psychology*, 52(2), 126–136. https://doi.org/10.1037/0022-0167.52.2.126

Scotland, J. (2012). Exploring the Philosophical Underpinnings of Research: Relating Ontology and Epistemology to the Methodology and Methods of the Scientific, Interpretive, and Critical Research Paradigms. English Language Teaching, 5(9). https://doi.org/10.5539/elt.v5n9p9

Shields, P. M., & Rangarajan, N. (2013). *A Playbook for Research Methods: Integrating Conceptual Frameworks and Project Management*. New Forums Press.

Stake, R. E. (1995). *The Art of Case Study Research*. SAGE Publications.

Yin, R. K. (2013). *Case Study Research: Design and Methods*. SAGE.

Yu, X., & Khazanchi, D. (2017). Using Embedded Mixed Methods in Studying IS Phenomenon: Risks and Practical Remedies with an Illustration. Communications of the Association for Information Systems, 41, 18–42. https://doi.org/10.17705/1CAIS.04102