

Research Methodology:

An Introduction for Undergraduates

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Readings selected and edited by:

Mr. IDAMMI YOUSSEF

youssef.idammi@gmail.com

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Table of Contents

Table of Contents.....	i
Course Description	iv
1. RESEARCH METHODOLOGY: AN INTRODUCTION I	1
1.1. Meaning of Research.....	1
1.2. Objectives of Research	1
1.3. Motivation in Research.....	1
1.4. Types of Research.....	2
1.5. Research Approaches.....	3
1.5.1. The Quantitative approach.....	3
1.5.2. The Qualitative approach	3
2. RESEARCH METHODOLOGY: AN INTRODUCTION II	4
2.1. Significance of Research	4
2.2. Research Methods vs. Research Methodology	4
2.2.1. Research methods	4
2.2.2. Research methodology.....	4
2.3. Research and Scientific Method	4
2.3.1. Inductive Reasoning – the empiricist’s approach	5
2.3.2. Deductive Reasoning – the rationalist’s approach	5
2.3.3. Hypothetico-deductive reasoning (Scientific Method)	6
2.4. Research Process	6
2.5. Criteria of Good Research	7
3. STEPS IN THE RESEARCH PROCESS	8
3.1. The Research Problem.....	8
3.1.1. Identifying the Research Problem.....	8
3.1.2. Selecting the Research Problem	9
3.1.3. Technique Involved in Defining a Research Problem	9
3.2. The Research Purpose Statement (+ Objectives)	10
3.3. The Research Questions	10
3.4. The Literature Review.....	10
3.4.1. How Does the Literature Review Differ for Quantitative and Qualitative Studies?.....	11
3.4.2. Steps in conducting a Literature Review.....	11
3.5. The Research Hypotheses	11
3.5.1. Propositions	12
3.5.2. Types of Hypotheses	12
4. RESEARCH DESIGN	13

4.2. Important Concepts Relating to Research Design	14
4.2.1. <i>Dependent and Independent Variables</i>	14
4.2.2. <i>Extraneous Variable</i>	14
4.2.3. <i>Control</i>	14
4.2.4. <i>Confounded Relationship</i>	14
4.2.5. <i>Research Hypothesis</i>	15
4.2.6. <i>Experimental and Non-experimental Hypothesis-testing Research</i>	15
4.2.7. <i>Experimental and Control Groups</i>	15
4.2.8. <i>Treatments</i>	15
4.2.9. <i>Experiment</i>	15
4.3. Sampling	16
4.4. Levels of Measurement in Research	16
4.4.1. <i>Nominal level</i>	17
4.4.2. <i>Ordinal level</i>	17
4.4.3. <i>Interval level</i>	17
4.4.4. <i>Ratio level</i>	17
5. METHODS OF DATA COLLECTION	18
5.1. Collection of Primary Data	18
5.1.1. <i>Observation method</i>	18
5.1.2. <i>Interview method</i>	19
5.1.3. <i>Questionnaires</i>	19
5.1.4. <i>Schedules</i>	20
5.1.5. <i>Some Other Methods of Data Collection</i>	20
5.2. Collection of Secondary Data	20
5.2.1. <i>Reliability of data</i>	20
5.2.2. <i>Suitability of data</i>	20
5.2.3. <i>Adequacy of data</i>	20
6. DOCUMENTING SOURCES IN APA STYLE (7TH EDITION)	21
6.1. Paper Formatting Guidelines	21
6.2. APA in-text citations	21
6.2.1. <i>A quotation</i>	22
6.2.2. <i>Quoting 40 words or more (APA block quotes)</i>	22
6.2.3. <i>A paraphrase / summary</i>	23
6.2.4. <i>One work with multiple authors in APA in-text citations</i>	23
6.2.5. <i>Missing information in APA in-text citations</i>	24
6.2.6. <i>Group author (Organizations) in APA in-text citations</i>	24
6.2.7. <i>Multiple works in the same parentheses</i>	25
6.3. APA List of References	25
6.3.1. <i>Citing a Book</i>	25
6.3.2. <i>Citing a Journal Article</i>	25
REFERENCES	26

Course Description

This is a basic introduction to the methodology of research, or specifically: an introduction to 'how to conduct your end-of-term monograph'. Obviously stated, this course is addressed to undergraduate students of university, simply because this is the category of students who are required to submit an end-of-term monograph!

Please understand, that, this is not an academic research paper, it is just a humble attempt to simplify things to my colleagues – yes, I am just an undergraduate student same as you, for now – far away from the very complicated academic norm that apparently some lecturers like to embrace.

The course is based on the syllabus and lectures of the professor Zakaria Jamaati (z.jamaati@uiz.ac.ma), Department of English Language and Culture, Faculty of Languages, Arts and Humanities, Ait Melloul, Morocco.

Different sources constitute this work, the following could be considered the main:

Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Pearson Education, Inc.

Hacker, D., & Sommers, N. (2013). *APA pocket style manual*. Bedford/St. Martin's.

Kothari, C. R. (2004). *Research methodology: Methods and techniques*. New Age International.

Youssef Idammi
Ait Melloul, Morocco
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1. Research Methodology: An Introduction I

1.1. Meaning of Research

Oxford Advanced Learner's Dictionary defines research as "a careful study of a subject, especially in order to discover new facts or information about it."

Research is an academic activity and as such the term should be used in a technical sense. Hence, the research activity comprises the following activities:

- Defining and redefining problems,
- Formulating hypotheses,
- Collecting, organizing and evaluating data,
- Making deductions,
- Attaining conclusions
- Testing the conclusions to determine if they fit the formulated hypotheses.

In its simplest form, research is defined as the pursuit of truth using study, observation, comparison-making and reaching of conclusions (Eversheim, 2008).

1.2. Objectives of Research

The **general purpose of research** is to discover answers to questions through the application of scientific procedures. Though each research study has its own specific purpose, we may think of **research objectives** as falling into a number of following broad groupings:

- To gain familiarity with a phenomenon or to achieve new insights into it (*exploratory research*);
- To portray accurately the characteristics of a particular individual, a group, or a situation (*descriptive research*);
- To determine the frequency or occurrence associated with a phenomenon (*diagnostic research*);
- To test a hypothesis of a causal relationship between two or more variables (*hypothesis-testing research*).

1.3. Motivation in Research

The possible motives for doing research may be either one or more of the following:

- Desire to get a research degree along with its consequential benefits;
- Desire to face the challenge in solving the unsolved problems;
- Desire to get intellectual joy of doing some creative work;
- Desire to be of service to society;
- Desire to get respectability.

However, many more factors such as directives of government, employment conditions, curiosity about new things, desire to understand causal relationships, social thinking and awakening, and the like may as well motivate people to perform research operations.

1.4. Types of Research

The basic types of research are as follows:

(i)	<i>Descriptive research</i>	<i>Analytical research</i>
	Descriptive research includes surveys and fact-finding enquiries of different kinds. The major purpose of descriptive research is description of the state of affairs as it exists at present. The main characteristic of this method is that the researcher has no control over the variables; s/he can only report what has happened or what is happening.	In analytical research, the researcher has to use facts or information already available, and analyze these to make a critical evaluation of the material.
(ii)	<i>Applied research (action research)</i>	<i>Fundamental research (basic/pure research)</i>
	Applied research refers to the scientific study that aims at solving pressing practical problems facing a society or an organization (e.g., <i>cure to a disease, improve crop production, improve the energy efficiency, etc.</i>)	Fundamental research is mainly concerned with improving and formulating scientific theories for better understanding and prediction of natural or other phenomena. It is about gathering knowledge for the sake of knowledge itself.
(iii)	<i>Quantitative research</i>	<i>Qualitative research</i>
	Quantitative research is based on the measurement of quantity or amount. It is applicable to phenomena that can be expressed in terms of quantity. i.e., numbers.	Qualitative research, on the other hand, is concerned with phenomena relating to or involving quality or kind.
(iv)	<i>Conceptual research</i>	<i>Empirical research (experimental research)</i>
	Conceptual research is that related to some abstract idea(s) or theory. It is generally used by philosophers and thinkers to develop new concepts or to reinterpret existing ones.	Empirical research relies on drawing conclusions about a phenomenon by verifying data using experience or observation. (Variables are controlled. And hypotheses are guessed before verification.)

All other types of research are variations of one or more of the above stated approaches, based on either the purpose of research, or the time required to accomplish research, on the environment in which research is done, or on the basis of some other similar factor.

1.5. Research Approaches

The above description of the types of research brings to light the fact that there are two basic approaches to research: THE QUANTITATIVE APPROACH and THE QUALITATIVE APPROACH.

1.5.1. The Quantitative approach

It is expressed in numbers and graphs. It is used to test or confirm theories and assumptions. This approach can be used to establish generalizable facts about a topic.

Common quantitative methods include experiments and observations recorded as numbers, and surveys with closed-ended questions.

Example: You survey 300 students at your university and ask them questions such as: “*On a scale from 1 to 5, how satisfied are you with your professors?*”

1.5.2. The Qualitative approach

It is expressed in words. It is used to understand concepts, thoughts or experiences. This approach enables you to gather in-depth insights on topics that are not well understood.

Common qualitative methods include interviews with open-ended questions, ethnography, observations described in words, and literature reviews that explore concepts and theories.

Example: You conduct in-depth interviews with 15 students and ask them open-ended questions such as: “*How satisfied are you with your studies?*”, “*What is the most positive aspect of your study program?*” and “*What can be done to improve the study program?*”

2. Research Methodology: An Introduction II

2.1. Significance of Research

“All progress is born of inquiry. Doubt is often better than overconfidence, for it leads to inquiry, and inquiry leads to invention” is a famous Hudson maxim in context of which the significance of research can well be understood.

Research inculcates scientific and inductive thinking and it promotes the development of logical habits of thinking and organization.

2.2. Research Methods vs. Research Methodology

2.2.1. Research methods

Research methods are all those methods/techniques which are used by the researcher during the course of studying their research problem. In other words, Research methods are the practical techniques used to carry out research. They are the ‘tools of the trade’ that make it possible to collect information and to analyze it.

- Methods are concerned with the collection of data;
- Statistical techniques are used for establishing relationships between the data and the unknowns;
- Methods which are used to evaluate the accuracy of the results obtained.

2.2.2. Research methodology

Research methodology is a way of explaining how a researcher intends to carry out their research. It’s a logical, systematic plan to resolve a research problem. It may be understood as a science of studying how research is done scientifically.

A research methodology encompasses what data is going to be collected and where from, as well as how it is going to be collected and analyzed (=research methods).

Research methodology has many dimensions and research methods do constitute a part of it. Though, the scope of research methodology is wider than that of research methods. Thus, when we talk of research methodology, we not only talk of the research methods but also consider the logic behind the methods we use in the context of our research study and explain why we are using a particular method or technique not another.

2.3. Research and Scientific Method

Research is a careful, detailed and systematic study of a phenomenon to learn something new about it or studying it from a new perspective. **Scientific method** is the way of conducting research. But it is a vital cog in any research as anyone with reasonable intelligence can easily perform research armed with scientific methods. In Merriam-Webster’s Dictionary, *scientific method* is

defined as “principles and procedures for the systematic pursuit of knowledge involving the recognition and formulation of a problem, the collection of data through observation and experiment, and the formulation and testing of hypotheses.”

Research is just another name for gathering data and information, analyzing it and then arriving at results, which is primarily what scientists do. To many, scientists appear as outlandish as they possess much deeper knowledge than common people. To an extent, this is true but they are scientists not because of their knowledge but because of their **scientific method** which produces results that are testable and tend to produce similar results when replicated. Any research that does not follow scientific methods is doomed to fail as authenticity of the results does not stand chance against scientific enquiry and analysis.

2.3.1. Inductive Reasoning – the empiricist’s approach

Inductive reasoning involves developing generalizations based on observation of a limited number of related events or experiences. It starts from specific observations or sensory experiences and then develops a general conclusion from them. This simple example gives an indication of the line of reasoning:

All the giraffes that I have seen have very long necks. (Repeated observations)

Therefore, I conclude that all giraffes have long necks. (Conclusion)

➤ **Limitations of induction**

- How many observations must be made before a reasonably reliable conclusion could be drawn?
- Could conclusions based on induction be generalized?
- Under which conditions should observations be made so a valid conclusion can be attained?

2.3.2. Deductive Reasoning – the rationalist’s approach

Deductive reasoning involves the reverse process. Namely, arriving at a specific conclusion based on general principles, observations, or experiences. Deductive reasoning begins with general statements (*premises*) and, through logical argument, comes to a specific conclusion. Again, a simple example will provide a guide to how this works:

All living things will eventually die. (General statement – first premise)

This animal is a living thing. (Inference – second premise)

Therefore, this animal will eventually die. (Conclusion)

➤ *Limitations of deduction*

- In order for a theory to be tested, it must be expressed as a statement called a **hypothesis**. The essential nature of a hypothesis is that it must be falsifiable. This means that it must be logically possible to make true observational statements which conflict with the hypothesis, and thus can falsify it. However, the process of **falsification** leads to a devastating result of total rejection of a theory, requiring a completely new start.
- Limited evidence in observations.
- The truth of the conclusions depends very much basically on the truth of the premise.

2.3.3. Hypothetico-deductive reasoning (Scientific Method)

The hypothetico-deductive method combines inductive and deductive reasoning, resulting in a to-and-from process; and it involves five major steps:

- 1 Observe the world and creatively decide on some **problem** that you'd like to solve.
- 2 Based on observations, form a **hypothesis** – try to state an explanation!
- 3 Deduce/derive **predictions**¹ from the hypothesis – if you assume the hypothesis is true, what consequences follow?
- 4 Practical or theoretical **testing** of the hypothesis – look for evidence (observations) that conflict with these predictions in order to disprove the hypothesis.
- 5 If the observations match the prediction, the hypothesis is **rendered more probable**. If they contradict the prediction, the hypothesis is **disproved** so you go back to step 2 and find yourself a new hypothesis!

It is this combination of experience with deductive and inductive reasoning that is the foundation of modern scientific research, commonly referred to as scientific method. It was only by the beginning of the 1960s that Karl Popper formulated the idea of the hypothetico-deductive method, even though it must have already been used in practice for decades (Walliman, 2010: 20).

2.4. Research Process

Research process consists of a number of closely related activities. [...] One should remember that the various steps involved in a research process are not mutually exclusive; nor they are separate and distinct. They do not necessarily follow each other in any specific order and the researcher has to be constantly anticipating at each step in the research process the requirements of the

¹ *Difference between a hypothesis and a prediction:* A **hypothesis** is an idea about how something works that can be tested using experiments. A **prediction** says what will happen in an experiment if the hypothesis is correct.

subsequent steps. However, the following order concerning various steps provides a useful procedural guideline regarding the research process:

1. Formulating the research problem;
2. Extensive literature review;
3. Development of working hypotheses;
4. Preparing the research design;
5. Determining sample design;
6. Collecting and processing data;
7. Analysis of data;
8. Hypothesis-testing;
9. Generalizations and interpretation;
10. Preparation of the report or the thesis.

We will look more deeply at the steps involved in the process of research later in this course.

2.5. Criteria of Good Research

Whatever may be the types of research works and studies, one thing that is important is that they all meet on the common ground of scientific method employed by them. One expects scientific research to satisfy the following criteria:

- **Good research is systematic:** it means that research is structured with specified steps to be taken in a specified sequence in accordance with the well-defined set of rules.
- **Good research is replicable:** this characteristic allows research results to be verified by replicating the study and thereby building a sound basis for decisions.
- **Good research is logical:** this implies that research is guided by the rules of logical reasoning and the logical process of induction and deduction are of great value in carrying out research.
- **Good research is empirical:** it implies that research is related basically to one or more aspects of a real situation and deals with concrete data that provides a basis for external validity to research results.

3. Steps in the Research Process

3.1. The Research Problem

One of the most challenging aspects of conducting research is to clearly identify the “problem” that leads to a need for your study. Individuals do not seem to give enough attention to why they are conducting their studies.

A **Research Problem (RP)** is a statement that addresses a gap in knowledge, challenge or contradiction in your field. A research problem, in general, refers to some difficulty which a researcher experiences in the context of either a theoretical or practical situation and wants to obtain a solution for the same.

One might ask: what is the *purpose of defining a research problem*? The research problem will generate the subject of your research, its aims and objectives, and will indicate what sort of data need to be collected in order to investigate the issues raised and what kind of analysis is suitable to enable you to come to conclusions that provide answers to the questions raised in the problem.

The problem to be investigated must be defined unambiguously for that will help to discriminate relevant data from the irrelevant ones. A proper definition of research problem will enable the researcher to be on the track whereas an ill-defined problem may create hurdles.

3.1.1. Identifying the Research Problem

Usually, we say that a research problem does exist if the following conditions are met together; the components of a research problem:

- (i) There must be an individual or a group which has some difficulty or problem.
- (ii) There must be some objective(s) to be attained at. If one wants nothing, one cannot have a problem.
- (iii) There must be at least two alternative means (or *courses of action*²) available for obtaining the objective(s) one wishes to attain. If a researcher has no choice of means, he simply doesn't have a problem.
- (iv) There must remain some doubt in the mind of a researcher with regard to the selection of alternatives. This means that research must answer the question concerning the relative efficiency of the possible alternatives.
- (v) There must be some environment(s) to which the difficulty pertains.

There are several factors which may result in making the problem complicated. For instance:

² **course of action** *n.* (*pl.* courses of action): a plan; a set of intended actions, through which one intends to achieve a goal. https://en.wiktionary.org/wiki/course_of_action

- The environment may change affecting the efficiencies of the courses of action or the values of the outcomes;
- The number of alternative courses of action may be very large;
- Persons not involved in making the decision may be affected by it and react to it favorably or unfavorably, and similar other factors.

Such elements (or at least the important ones) may be thought of in context of a research problem.

3.1.2. Selecting the Research Problem

The research problem undertaken for study must be carefully selected. The task is a difficult one although it may not appear to be so. Help may be taken from a research guide in this connection. However, the following points may be observed by a researcher in selecting a research problem or a subject for research:

- (i) Subject which is overdone should not be normally chosen, for it will be a difficult task to throw any new light in such a case.
- (ii) Controversial subjects should not become the choice of an average researcher.
- (iii) Too narrow or too vague problems should be avoided.
- (iv) The subject selected for research should be familiar and feasible so that the related research material or sources of research are within one's reach.
- (v) The importance of the subject, the qualifications and the training of a researcher, the costs involved, and the time factor are few other criteria that must also be considered in selecting a problem.
- (vi) The selection of a problem must be preceded by a preliminary study if the field of inquiry is relatively new.

3.1.3. Technique Involved in Defining a Research Problem

The research problem should be defined in a systematic manner, giving due weightage to all relating points. The technique for this purpose involves the undertaking of the following steps generally one after the other:

- (i) Statement of the problem in a general way;
- (ii) Understanding the nature of the problem;
- (iii) Surveying the available literature;
- (iv) Developing the ideas through discussions;
- (v) Rephrasing the research problem into a working proposition.

For an in-depth comprehension of each step above, see (Kothari, 2004: pp. 27-29).

3.2. The Research Purpose Statement (+ Objectives)

The purpose statement states specifically the purpose or objective of the research project.

It is a statement that advances the overall direction or focus for the study. Researchers describe the purpose of a study in one or more succinctly formed sentences. **It is used both in quantitative and qualitative research** and is typically found in the “statement of the problem” section. It often appears as the last sentence of an introduction. You can recognize it because researchers typically state it beginning with the phrase “The purpose of this study is . . .” (Creswell, 2012, p. 110).

3.3. The Research Questions

A research question is “a central question that a research project seeks to answer”. Choosing a research question is **an essential element of both quantitative and qualitative research**.

The research questions add another level of specificity to the development of the RP, they are the operationalization of RP statements into specific measurable goals.

- Research questions are strictly related to the data collection method to be used to answer each research question.
- They provide the researcher with an action plan for the development and identification of research instruments.
- RP is an arching question that aims to solve a problem.
- It could be broken into multiple sub-questions.
 - Sub-questions:
 - Each sub-question relates to the arching question.
 - Each sub-question focuses on one aspect of the RP (sub-problems).
 - Sub-questions provide practical ways for answering the RP and build up an answer to the arching question (Research methods).

3.4. The Literature Review

When planning to conduct a research project, you have to know that:

- You are contributing to the development of knowledge in the field you are studying.
- You are not the only one creating knowledge.

Therefore, you have to know the current state of knowledge – identify the research gap – in your chosen topic, this is exactly why we do ‘The Literature Review’. A **literature review** is an overview of the previously published works on a topic.

“A literature review is “the process of searching for, reading, summarizing, and synthesizing existing work on a topic [...]” (Adler & Clark, 2011, p. 89). It results in a “comprehensive overview of the previous research” on a topic as related to your research question (Wilder, Bertrand Jones, & Osborne-Lampkin, in press).” (as cited in Leavy, 2017, p. 56).

3.4.1. How Does the Literature Review Differ for Quantitative and Qualitative Studies?

In a **quantitative study**, researchers discuss the literature **extensively at the beginning** of a study. This serves two major purposes: it justifies the importance of the research problem, and it provides a rationale for (and foreshadows) the purpose of the study and research questions or hypotheses. [...] The authors may also include the literature into the end of the study to confirm or disconfirm prior predictions made at the beginning of the study.

In a **qualitative study**, the literature serves slightly differently. Similar to quantitative research, the authors mention the literature at the beginning of the study to document or justify the importance of the research problem, but unlike quantitative studies, **they do not discuss it extensively** [...]. In many qualitative projects, researchers often cite the literature at the end of the study as a contrast or comparison with the major findings in the study.

3.4.2. Steps in conducting a Literature Review

Although conducting a literature review follows no prescribed path, if you plan to design and conduct a study, you will typically go through the following interrelated steps:

- 1 Identify key terms (keywords) to use in your search for literature.
- 2 Search for relevant literature to your topic by using your keywords. Some useful databases to search for journals and articles include: (e.g., Google Scholar, JSTOR, etc.)
- 3 Critically evaluate and select the literature for your review. Look for *Quality, Accuracy, Authority of reference, Non-Biasness, Specificity*, etc.
- 4 Analyze and organize your sources using a literature matrix (e.g., Zotero.org).
- 5 Organize the literature you have selected by understanding the connections and relationships between the sources you've read. Based on your reading and notes, you can look for *Trends and patterns, Themes, Debates, conflicts and contradictions, Gaps*, etc.
- 6 Write your literature review (just like any other academic text: *introduction, main body, conclusion*) and make sure to introduce key issues of your research problem through the analyzing of your literature.

3.5. The Research Hypotheses

A **hypothesis** is a statement predicting how variables relate to each other and that can be *tested* through research. Hypotheses are typically used in experimental designs and survey research (Leavy, 2017: 69). Therefore, **Qualitative research does NOT require hypotheses**; it is also worth mentioning that certain research projects require operationalizing **Research Questions** in form of hypotheses.

Two classifications (derivation) of hypotheses:

- **Inductive:** A generalization based on specific observations.
- **Deductive:** based on a theory and provides evidence which supports, develops or disputes it.

After collecting and analyzing the data, the hypothesis is either supported or rejected. If it is confirmed, it allows to predict what will happen in the future or to prevent something from happening.

3.5.1. Propositions

As mentioned earlier, qualitative research does not require hypotheses. Thus, in qualitative studies, researchers only suggest a set of propositions to understand the nature of their participants and the contexts before proposing a focus for the study.

- Stating the particular situation.
- Indicating the factors or events related to that situation.
- Indicate a conclusion which could be drawn from these interrelationships.
- Proposition do not require the rigor of the hypothesis.

See (Walliman, 2010, pp. 35-36) for more.

3.5.2. Types of Hypotheses

In total, three primary kinds of hypotheses are distinguished

3.5.2.1. Null hypothesis

A null hypothesis predicts that there is no significant difference between two groups with respect to the variable being tested. You write a null hypothesis as follows:

“There is no significant difference between group 1 and group 2 with respect to X.”

3.5.2.2. Directional hypothesis

A directional hypothesis predicts a specific difference between two groups with respect to the variable being tested. You write a directional hypothesis as follows:

“Group 1 experiences higher rates of X than group 2.”

3.5.2.3. Nondirectional hypothesis

A nondirectional hypothesis predicts a difference between two groups with respect to the variable being tested but does not predict what that specific difference will be. You write a nondirectional hypothesis as follows:

“There is a difference between group 1 and group 2 with respect to X.”

4. Research Design

Research Design is a crucial task that follows right after defining *the Research Problem, Purpose statement, Questions, and Literature Review*. Decisions regarding what, where, when, how much, by what means concerning an inquiry or a research study are what constitute a research design.

Research design (RD) is the advance planning of the methods to be adopted for collecting the relevant data and the techniques to be used in the analysis, keeping in view the objectives of the research, time, money, and such factors involved. It is the process that the investigator will follow from the start-up to completion of the study. Research design can be thought of as the “glue” that holds all of the elements in a research project together.

A research design is not just a work plan. A work plan details what has to be done to complete the project, but a research design ensures that the evidence obtained enables us to answer the initial research questions in an unambiguous and convincing way. Research design is necessary because it makes the smooth and logical sailing through the various research procedures possible.

The design decisions happen to be in respect of:

- | | |
|--|--|
| (i) <i>What is the study about?</i> | (vii) <i>What will be the sample design?</i> |
| (ii) <i>Why is the study being made?</i> | (viii) <i>What techniques of data collection will be used?</i> |
| (iii) <i>Where will the study be carried out?</i> | (ix) <i>How will the data be analyzed?</i> |
| (iv) <i>What type of data is required?</i> | (x) <i>In what style will the report be prepared?</i> |
| (v) <i>Where can the required data be found?</i> | |
| (vi) <i>What periods of time will the study include?</i> | |

Keeping in view the above stated design decisions, one may split the overall research design into the following parts:

- (a) ***the sampling design*** which deals with the method of selecting items to be observed for the given study;
- (b) ***the observational design*** which relates to the conditions under which the observations are to be made;
- (c) ***the statistical design*** which concerns with the question of how many items are to be observed and how the information and data gathered are to be analyzed; and
- (d) ***the operational design*** which deals with the techniques by which the procedures specified in the sampling, statistical and observational designs can be carried out.

In brief, a good research design must, at least, contain—(a) a clear statement of the research problem; (b) procedures and techniques to be used for gathering information; (c) the population to be studied; and (d) methods to be used in processing and analyzing data.

4.2. Important Concepts Relating to Research Design

4.2.1. Dependent and Independent Variables

What is a variable?

A **variable** is a characteristic or 'attribute' of an individual or an organization that (a) can be measured or observed by the researcher and that (b) varies among individuals or organizations studied (Creswell, 2012, p. 630). As such the concepts like weight, height, income are all examples of variables (Kothari, 2004, p. 33).

A **dependent variable** is an attribute or characteristic that is affected or influenced by the *independent variable*. Researchers observe dependent variables to determine the effect of their intervention (=manipulation).

An **independent variable** is one that affects or influences an outcome or dependent variable. Researchers manipulate independent variables.

4.2.2. Extraneous Variable

Extraneous variables are factors that are not directly linked with the study but may affect an experiment's dependent variables, which – dependent variables – are the controlled conditions. Since extraneous variables can change an experiment's interpretation and results, it's important to learn how to control them.

Example: *Robert conducted a study to examine how lack of sleep affects college students. In this experiment, each student participant is a **dependent variable**, while the **independent variable** is the amount of sleep that they get. In this study, an **extraneous variable** could include other factors that affect college students, such as living in a loud dormitory or having a smoke detector malfunction one night and wake up a participant. To **control** these extraneous variables, Robert might ask students to sleep in a quiet location for the duration of the experiment.*³

4.2.3. Control

One important characteristic of a good research design is to minimize the effect of extraneous variable(s). The technical term 'control' is used when we design the study minimizing the effects of extraneous independent variables.

4.2.4. Confounded Relationship

When the dependent variable is not free from the influence of extraneous variable(s), the relationship between the dependent and independent variables is said to be confounded by an extraneous variable(s).

³ This example is retrieved from:

<https://www.indeed.com/career-advice/career-development/extraneous-variable>

4.2.5. Research Hypothesis

When a prediction or a hypothesized relationship is to be tested by scientific methods, it is termed as research hypothesis. A research hypothesis links/relates an independent variable to a dependent variable. Usually a research hypothesis must contain, at least, one independent and one dependent variable.

4.2.6. Experimental and Non-experimental Hypothesis-testing Research

When the purpose of research is to test a research hypothesis, it is termed as **hypothesis-testing research**.

Research in which the independent variable is manipulated is termed '**experimental hypothesis-testing research**' and research in which an independent variable is not manipulated is called '**non-experimental hypothesis-testing research**'. See (Kothari, 2004, pp. 34-35) for an example.

4.2.7. Experimental and Control Groups

In an *experimental hypothesis-testing research*, the group that is exposed to the usual conditions is termed a '**control group**'; the group that is exposed to some novel or special condition (i.e. manipulation of independent variables) is termed an '**experimental group**'.

4.2.8. Treatments

The different conditions under which *experimental* and *control groups* are put are usually referred to as '**treatments**'.

4.2.9. Experiment

The process involving checking the validity of a hypothesis statement of a research problem is called an experiment.

Experiments in general are used by researchers to test activities, practices, or procedures to determine whether they influence an outcome or dependent variable.

4.3. Sampling

When you conduct research about a group of people (e.g., a **population**), it's rarely possible to collect data from every person in that group. Instead, you select a sample. The **sample** is the group of individuals who will actually participate in the research.

To draw valid conclusions from your results, you have to carefully decide how you will select a sample that is *representative* of the group as a whole.

➤ *Population vs. sample*

The **population** is the entire group that you want to draw conclusions about; the **sample** is the specific group of individuals that you will collect data from.

There are two types of sampling methods:

- **Probability sampling** involves random selection, allowing you to make strong statistical inferences about the whole group.
- **Non-probability sampling** involves non-random selection based on convenience or other criteria, allowing you to easily collect data.

4.4. Levels of Measurement in Research

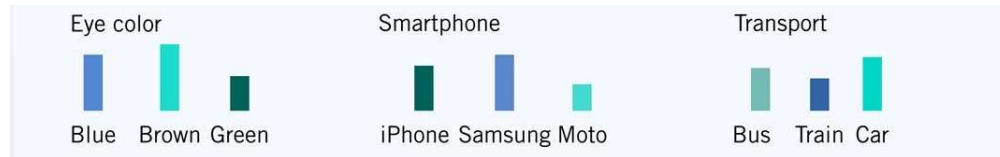
Data can be measured in different ways depending on their nature. These are commonly referred to as levels of measurement – **nominal**, **ordinal**, **interval** and **ratio**. Levels of measurement tell you how precisely variables are recorded.

	Nominal	Ordinal	Interval	Ratio
Categorizes and labels variables	✓	✓	✓	✓
Ranks categories in order		✓	✓	✓
Has known, equal intervals			✓	✓
Has a true or meaningful zero				✓

4.4.1. Nominal level

Nominal measurement is very basic – the data can only be categorized based on their names or other qualitative classifications they belong to; data are labelled into mutually exclusive groups, but there is no order between the categories.

➤ *Examples of nominal scales*



4.4.2. Ordinal level

You can categorize and rank your data in an order, but you cannot say anything about the relative degree of difference between the rankings; although you can rank the *top 5 Olympic medalists*, this scale does not tell you how close or far apart they are in number of wins.

➤ *Examples of ordinal scales*

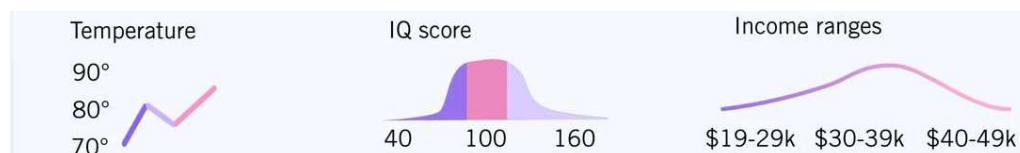


4.4.3. Interval level

Interval data are measured along a numerical scale that has equal intervals between adjacent values.

Unlike the ratio scale (the fourth level of measurement), interval data has no true zero; in other words, a value of zero on an interval scale does not mean the variable is absent.

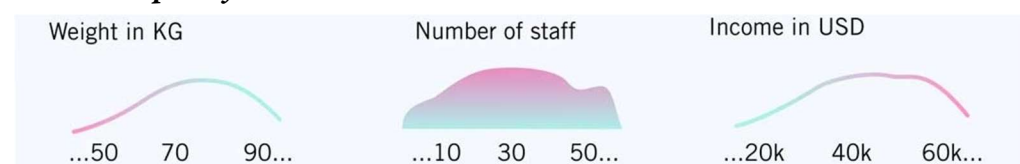
➤ *Examples of interval scales*



4.4.4. Ratio level

Ratio data are measured along a numerical scale that has equal distances between adjacent values, and a true zero, i.e., a zero point on a ratio scale means the complete absence of the variable.

➤ *Examples of ratio scales*



5. Methods of Data Collection

Right after defining the research problem, and setting the research design, the data collection process begins.

For a linguistic analysis of language, for example, the linguist will need some linguistic data, i.e., examples or samples of written or spoken language.

The researcher should keep in mind two types of data: primary and secondary data. **Primary data** are data originated for the first time by the researcher through direct efforts and experience, specifically for the purpose of addressing his research problem; it is also known as first hand or raw data. **Secondary data**, on the other hand, are data which have already been collected by other researchers and which have already been passed through the statistical process.

Data are not stable, instead, data seem to be:

Elusive: what is true today, may not be true tomorrow.

Corruptible: as data is further reported, it may lose accuracy and become inconsistent. Research methods may not allow a full picture interpretation.

Depending on the theoretical framework and methodological approach of a particular study, data can be collected by using different methods as we will see in the next sections.

5.1. Collection of Primary Data

In **experimental research**, primary data is collected during the course of doing experiments. In **descriptive research** and **surveys**, however, primary data is collected through observation or direct interaction with participants.

Important methods of collecting primary data, particularly in surveys and descriptive researches are as following:

5.1.1. Observation method

The observation method of data collection is a social research technique that involves the direct observation of phenomena in their natural setting; it is commonly used in studies relating to behavioral sciences. It focuses on 'natural' settings which allow the explanation of social processes and phenomena.

5.1.1.1. Structured and unstructured observation

in **Structured or 'systematic' observation**, the observation is characterized by a careful definition of the units to be observed; the observer observes events using a guide that has been planned in advance; structured observation is considered appropriate in **descriptive studies**.

Unstructured observation, however, is conducted in an open and free manner in a holistic way without the use of a predetermined guide; unstructured observation is considered appropriate in **exploratory studies**.

5.1.1.2. Participant and non-participant observation

We often talk about participant and non-participant types of observation in the context of studies, particularly of social sciences.

Participant observation is when the observer fully engages himself and becomes an active participant of the group that is being studied.

Non-participant observation is when the observer remains outside the group and simply watches their behavior/experiences.

N.B. When the presence of the observer may be unknown to the people he is observing, such an observation is described as **disguised observation**.

5.1.2. Interview method

Interviews are particularly useful for getting the story behind a participant's experiences. The interviewer can pursue in-depth information around a topic.

Schostak (2006, p. 54) suggests that an interview is an extendable conversation between partners that aims at having an 'in-depth information' about a certain topic or subject, and through which a phenomenon could be interpreted in terms of the meanings interviewees bring to it. Two types of interviews are usually used:

5.1.2.1. Structured interviews

Structured interviews consist of a series of predetermined questions that all the interviewees answer in the same order.

Data analysis seems straightforward because the researcher can compare the different answers to the same questions.

5.1.2.2. Unstructured interviews

Unstructured interviews do not follow a system of pre-determined questions in data-gathering process. They are characterized by freedom and flexibility in conversation: Open-ended questions are asked in any order; interviewees are free to provide detailed answers.

5.1.3. Questionnaires

A **questionnaire** is a list of questions or 'items' used to gather data from respondents about their attitudes, experiences, or opinions. Questionnaires can be used to collect quantitative and/or qualitative information.

The 'questions' involved in a questionnaire are referred to as items because they do not always take the form of questions; that is why they are called items.

Brown (2001) defined a questionnaire as “any written instruments that present respondents with a series of questions or statements to which they are to react either by writing out their answers or selecting from among existing answers” (p. 6).

Your questionnaire can include either *close-ended* or *open-ended* questions, or a combination of both.

- **Close-ended questions** include a predefined list of answer options.
- **Open-ended questions** ask the respondent to provide an answer in their own words.

5.1.4. Schedules

S K I P P E D, D Y O R !

5.1.5. Some Other Methods of Data Collection

You might consider some other methods of data collection, particularly used by big business houses in modern times which include: (a) *warranty cards*; (b) *distributor audits*; (c) *pantry audits*; (d) *consumer panels*; (e) *using mechanical devices*; (f) *through projective techniques*; (g) *depth interviews*, and (h) *content analysis*.

5.2. Collection of Secondary Data

Researcher must be very careful in using secondary data. By way of caution, the researcher, before using secondary data, must see that they possess following characteristics:

5.2.1. Reliability of data

The reliability can be tested by finding out such things about the data in question:

- | | |
|---|--|
| (a) Who collected the data? | (d) At what time were they collected? |
| (b) What were the sources of data? | (e) Was there any bias of the compiler? |
| (c) Were they collected by using proper methods | (f) What level of accuracy was desired? Was it achieved? |

5.2.2. Suitability of data

The data that are suitable for one enquiry may not necessarily be found suitable in another enquiry. Hence, if the available data are found to be unsuitable, they should not be used by the researcher.

5.2.3. Adequacy of data

The accuracy of the original data should be related to the purpose of the present research.

6. Documenting Sources in APA Style (7th edition)

In this section, our concern simply is: **How to cite sources in your research project using APA Style (7th EDITION).**

Multiple formatting and referencing style guidelines are used by researchers depending on who requires which style. The most one used for research in social sciences is the American Psychological Association (APA) formatting & referencing style guideline—known as: **APA Style**.

6.1. Paper Formatting Guidelines

1. Language used in papers should be:
 - **Clear:** be specific in descriptions and explanations.
 - **Concise:** condense information when you can.
 - **Plain:** use simple, descriptive adjectives, minimize figurative language, and avoid contractions and colloquialisms.
2. Numerals under 10 should be spelled out; 10 and above should be expressed as a number.
3. Past tense verbs should be used to refer to events that occurred at a specific point in the past.
4. Use the passive voice when stressing the recipient or object of the action.
 - ✗ *We found the tests inconclusive.*
 - ✓ *The tests were inconclusive.*
5. Do not use “he” or “she” as a generic pronoun; it is acceptable to use “they” or rephrase the sentence.
6. Avoid biased (discriminatory) language that reveals sex, gender, race, disability, or socio-economic status.

6.2. APA in-text citations

There are two types of in-text citations, *parenthetical* and *narrative*. Both supply the same basic information, but are formatted differently. **Parenthetical** in-text citation is placed between parentheses; **Narrative** in-text citation is naturally integrated into a sentence.

- EXAMPLE: PARENTHETICAL IN-TEXT CITATION

There is a correlation between social media usage and anxiety symptoms in teenagers (Parker, 2019).

- EXAMPLE: NARRATIVE IN-TEXT CITATION

Parker (2019) found a correlation between social media usage and anxiety symptoms in teenagers.

6.2.1. A quotation

To cite a quote in APA, you always include the author's last name, the year of publication, and the page on which the quote can be found. The page number is preceded by "p." (for a single page) or "pp." (for a page range).

- EXAMPLE: PARENTHETICAL IN-TEXT CITATION FOR QUOTATIONS

A recent study of student plagiarism found that "plagiarism is often a matter of confusion rather than deception" (Horváth & Kovács, 2020, p. 4).

- EXAMPLE: NARRATIVE IN-TEXT CITATION FOR QUOTATIONS

Horváth and Kovács (2020) argue that "plagiarism is often a matter of confusion rather than deception" (p. 4).

6.2.2. Quoting 40 words or more (APA block quotes)

If the quote contains 40 words or more, it must be formatted as a block quote. To format a block quote in APA Style:

- Do not use quotation marks.
- Start the quote on a new line.
- Indent the entire quote 0.5 inches.
- Double-space the entire quote.

Like regular quotes, block quotes can be cited with a parenthetical or narrative citation. However, if the block quote ends with a period, place the citation after the period.

- EXAMPLE: PARENTHETICAL IN-TEXT CITATION FOR BLOCK QUOTES

Sometimes it is necessary to quote a source at length:

Block quoting is particularly useful when you want to comment on an author's language or present an argument that you will then critique. By setting the quote on a new line and indenting it, the passage is clearly marked apart from your own words. Therefore, no quotation marks are necessary. (O'Connor, 2019, p. 38)

- EXAMPLE: NARRATIVE IN-TEXT CITATION FOR BLOCK QUOTES

O'Connor (2019) explains the purpose and format of block quotes:

Block quoting is particularly useful when you want to comment on an author's language or present an argument that you will then critique. By setting the quote on a new line and indenting it, the passage is clearly marked apart from your own words. Therefore, no quotation marks are necessary. (p. 38)

6.2.3. A paraphrase / summary

In paraphrasing, we state another author's ideas in our own words.

- EXAMPLE: PARENTHETICAL IN-TEXT CITATION FOR PARAPHRASING

Sibutramine suppresses appetite by blocking the reuptake of the neurotransmitters serotonin and norepinephrine in the brain (Yanovski & Yanovski, 2002, p. 594).

- EXAMPLE: NARRATIVE IN-TEXT CITATION FOR PARAPHRASING

Yanovski and Yanovski (2002) explained that sibutramine suppresses appetite by blocking the reuptake of the neurotransmitters serotonin and norepinephrine in the brain (p. 594).

6.2.4. One work with multiple authors in APA in-text citations

If a work has two authors, separate their names with "&" in a parenthetical citation or "and" in a narrative citation. If there are three or more authors, only include the first author's last name followed by "et al.", meaning "and others".

	Parenthetical	Narrative
One author:	(Harris, 2020)	Harris (2020)
Two authors:	(Harris & Cook, 2020)	Harris and Cook (2020)
Three or more authors:	(Harris et al., 2020)	Harris et al. (2020)

6.2.5. Missing information in APA in-text citations

6.2.5.1. Unknown Author

For works with an unknown author, include the title and year of publication in the in-text citation (note that the title moves to the author position in the reference list entry as well).

- EXAMPLE: PARENTHETICAL IN-TEXT CITATION FOR UNKNOWN AUTHORS

("Interpersonal Skills", 2019)

- EXAMPLE: NARRATIVE IN-TEXT CITATION FOR UNKNOWN AUTHORS

As demonstrated by "Interpersonal Skills" (2019) ...

N.B. In the rare case when "Anonymous" is specified as the author, treat it as if it were a real name: (Anonymous, 2009). In the list of references, also use the name "Anonymous" as author.

6.2.5.2. Unknown Date

When the date is unknown, use the abbreviation "n.d." (for "no date").

- EXAMPLE: PARENTHETICAL IN-TEXT CITATION FOR UNKNOWN DATE

(Magnus, n.d.).

- EXAMPLE: NARRATIVE IN-TEXT CITATION FOR UNKNOWN DATE

Magnus (n.d.) argued that ...

6.2.6. Group author (Organizations) in APA in-text citations

If the author is a government agency or another organization, name the organization in the signal phrase or in the parenthetical citation the first time you cite the source. If the organization has a familiar abbreviation, you may include it in brackets the first time you cite the source and use the abbreviation alone in later citations.

	Parenthetical	Narrative
Group author with abbreviation:		
▪ First citation	(National Institute of Mental Health [NIMH], 2020)	National Institute of Mental Health (NIMH, 2020)
▪ Subsequent citations	(NIMH, 2020)	NIMH (2020)
Group author without abbreviation	(Stanford University, 2020)	Stanford University (2020)

- EXAMPLE: PARENTHETICAL IN-TEXT CITATION FOR AN ORGANIZATION AS AUTHOR

Obesity puts children at risk for a number of medical complications, including Type 2 diabetes, hypertension, sleep apnea, and orthopedic problems (Henry J. Kaiser Family Foundation, 2004, p. 1).

6.2.7. Multiple works in the same parentheses

If a statement is supported by multiple sources, the in-text citations can be combined in one parenthesis. Order the sources alphabetically, and separate them with a semicolon.

- EXAMPLES: PARENTHETICAL IN-TEXT CITATION FOR MULTIPLE WORKS

Researchers have indicated that studies of pharmacological treatments for childhood obesity are inconclusive (Berkowitz et al., 2003; McDuffie et al., 2002).

Several studies have replicated these results (Brown, 2009; Porter, 2004; Smith, 2015).

6.3. APA List of References

6.3.1. Citing a Book

- REFERENCE ENTRY

Smith, T., Williams, B. M., & Streefkerk, R. (2020). *The citation manual for students: A quick guide* (2nd ed.). Wiley. <https://doi.org/10.1000/182>

- IN-TEXT CITATION

- Parenthetical: (Smith et al., 2020)
- Narrative: Smith et al. (2020)

6.3.2. Citing a Journal Article

- REFERENCE ENTRY

Andreff, W., & Staudohar, P. D. (2000). The evolving European model of professional sports finance. *Journal of Sports Economics*, 1(3), 257–276. <https://doi.org/10.1177/152700250000100304>

- IN-TEXT CITATION

- Parenthetical: (Andreff & Staudohar, 2000)
- Narrative: Andreff and Staudohar (2000)

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- How to Cite in APA Format (7th edition) | Guide & Generator
<https://www.scribbr.com/category/apa-style/>
- APA 7th Edition (2020) | The 17 Most Notable Changes <https://www.scribbr.com/apa-style/apa-seventh-edition-changes/>
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- How to Write a Research Problem Statement | Dissertation by Design
<https://youtu.be/PdtmMlC8OQw>