

(Option) SL

Instructor : Dr. Bashar, Ahmed

(Major) Research Methodology

(Grade) Senior Students/ 3rdYear

METHODOLOGY IN RESEARCH : AN INTRODUCTION

Outcomes : By the completion of this tutorial, you will be able to :

1. **Identify** paradigm, design, methodology and methods ;
2. **Explore** research techniques and tools,
3. **Examine** the research process,
4. **Evaluate** different research methods
5. **Compare** and **contrast** the benefits of methods, and tools.
6. **Raise** students' awareness of the fact that different designs, methodologies, methods and tools serve different assumptions and needs.

Research is a craft.

R. Bernard

Food-for-thought Questions

Try to answer/ discuss the following questions with teacher and peers

1. *Is there any difference between methodology and method at all?*
2. *Are qualitative and quantitative methodologies inherently interconnected? How and why?*
3. *Is it fair to put claim that quantitative methods are superior to qualitative methods? Why?*
4. *In what way is qualitative research qualitative?*
5. *To what extent quantitative research is quantitative?*
6. *Can it be rightly claimed that science provides "evidence" rather than "proofs"?*
7. *Is it true that all research methodology a means to an end (i.e., improve understanding)?*

Research is the bedrock of science.

Willie Tan

Terminology Used in this tutorial

Make sure that you understand the following terms.

Methodology – method- design – exploratory design - confirmatory/ conclusive design - qualitative - quantitative - praxis – paradigm- tools - research techniques - research process -ontology- epistemology- empirical

Point to Ponder & Wonder

Peruse the following then discuss it with your classmates and teacher.

Edward Jenner¹ was born in Berkeley, Gloucestershire on 17 May 1749, the son of the local vicar. At the age of 14, he was apprenticed to a local surgeon and then trained in London. In 1772, he returned to Berkeley and spent most the rest of his career as a doctor in his native town.

In 1796, he carried out his now famous experiment on eight-year-old James Phipps. Jenner inserted pus taken from a cowpox pustule and inserted it into an incision on the boy's arm. He was testing his theory, drawn from the folklore of the countryside, that milkmaids who suffered the mild disease of cowpox never contracted smallpox, one of the greatest killers of the period, particularly among children. Jenner subsequently proved that having been inoculated with cowpox Phipps was immune to smallpox. He submitted a paper to the Royal Society in 1797 describing his experiment, but was told that his ideas were too revolutionary and that he needed more proof. Undaunted, Jenner experimented on several other children, including his own 11-month-old son. In 1798, the results were finally published and Jenner coined the word vaccine from the Latin 'vacca' for cow.

Acceptance without proof is the fundamental characteristic of Western religion. Rejection without proof is the fundamental characteristic of western science

Gary Zujav

Jenner was widely ridiculed. Critics, especially the clergy, claimed it was repulsive and ungodly to inoculate someone with material from a diseased animal. A satirical cartoon of 1802 showed people who had been vaccinated sprouting cow's heads. But the obvious advantages of vaccination and the protection it provided won out, and vaccination soon became widespread. Jenner became famous and now spent much of his time researching and advising on developments in his vaccine. Jenner carried out research in a number of other areas of medicine and was also keen on fossil collecting and horticulture. He died on 26 January 1823.

Introduction

Nothing in the scientific research is random. Everything follows a certain pattern. The researchers' way of carrying out their task is often referred to as research **methodology**. Research methodology is the roadmap that conscientious researchers would scrupulously follow to achieve their primary goal: establish facts and reach the hidden truth. Without such methodological rigor, scientific research would only be another human activity, clumsy and pointless. Jonker and Pennick (2010: 21) corroborate "The essence of methodology is structuring one's actions according to the nature of the question at hand and the desired answer one's wishes to generate". Research

¹ http://www.bbc.co.uk/history/historic_figures/jenner_edward.shtml

methodology lends itself to be the framework that delimits the area of research which gives sense to research and helps avoid the high jacking of its precious findings. "The real purpose of the scientific method" notes Persig (1999) "is to make sure nature has not misled you into thinking you know something you actually do not know" (cited in Coolican 2009: 25). Overall, research methodology is the researcher's roadmap to a successful, meaningful, and beneficial research experience.

Description

*The current tutorial attempts to cover an interesting topic, which is research methodology. The stress will be this time on **methodology** [in research] as an in-depth investigation will lead to exploring conflicting views of methodologies, which seems to characterize this field.*

One point in case, the conflict between quantitative and qualitative researchers. Each of whom considers his/ her "trade" the only dependable way of finding out truth. This journey in quest of a better approach to make sense of research methodology in education will help you understand different concepts and how they might work together to reach a compromise.

The language of "quantitative" and "qualitative" has always been distinctly unhelpful as a technical guide to research methods, and we would be better off without it"

Oakly 2000 (in Gomm, R.)

[Inquiry] Paradigm

Constitutive Definition

Different disciplines, such as philosophy and grammar, use the term paradigm with different connotations, which may be confusing and even daunting to novice researchers. Paradigm (pronounced /'per-ə-'dīm/) derives from Ancient Greek παράδειγμα (paradeigma), "pattern, example, sample" from the verb παραδείκνυμι (paradeiknumi), "exhibit, represent, expose" and that from παρά (para), "beside, beyond" and δείκνυμι (deiknumi), "to show, to display to point out". In Arabic, paradigm may be translated to نموذج/منظور.

Operational Definition

The American physicist, historian, philosopher Thomas S. Kuhn (1922-1996) in his book *The Structure of Scientific Revolution* (1996), popularized the term *paradigm*. Kuhn believes that science does not progress in a vertical fashion, i.e., piling up of books [i.e., knowledge], but witnesses *paradigm shifts*. Scholars from different historical periods shared and differed in perceptions of how research should be conceived and conducted and with what type of instruments. Lincoln and Guba (1985: 7) note "Every historical age has exhibited some characteristic way of answering the eternal questions of what there is that can be known and how one can go about knowing it". Questions such as: Does the reliance on rationalism, i.e., logical thinking/ reasoning, infallibly lead to the truth? Or do experimentations exclusively lead to dependable breakthroughs, facts and discoveries? To answer such philosophical questions, scholars have undertaken different ways, which are only common among those of whom have had common research grounds, to explore reality.

In every research discipline a *framework* of traditions, steps, beliefs, procedures, and practices have taken shape, and under the influence of Michael Polanyi, T. S. Kuhn coined the term *paradigm*. Kuhn identifies paradigm as the "accepted examples of actual scientific practice- examples which include law, theory, application, and instrumentation together- that provide models from which spring particular coherent traditions of scientific research" Phillips et. al. (2012: 70). In the same line, Punch (2009: 16) defines a paradigm as a "set of assumptions about the world, and about what constitute proper techniques and topics for inquiring into that world". As for Guba, an inquiry paradigm is a "worldview" and defines it as " a basic set of beliefs that guide action" (cited in Creswell 2007).

According to Punch (2009: 16), paradigms address three major questions:

1. Ontological question

Ontology broadly refers to the study of what is **real** or what **exists**. The term derives from Ancient Greek: On[to] being, what exists and logos: study, science. or knowledge. A typical ontological question is: *Is there life after death?* Religions confirm that there is an everlasting one. Atheists, on the other hand, reject the idea of the existence of another life after death.

Chakravarty identifies ontology as "a branch of philosophy concerned with questions of existence" (2017: xi). By asking ontological questions, we are trying to make sense of the real world. Consider the following ontological questions in education: What is reading? What kind of processes are involved in reading? Are there any interaction between author-text-reader? What type of message is put through the text? What cognitive processes determine comprehension of the read text? What cultural aspects that need be mastered to understand [thanks to reading] a written text? etc.

Creswell (2007: 17) illustrates ontology as follows:

Assumption	Question	Characteristics	Implications for practice [examples]
Ontology	What is the nature of reality?	Reality is subjective and multiple, as seen by participants in the study.	Researcher uses quotes and themes in words of participants and provides evidence of different perspectives.

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Therefore, ontological questions seek to determine the very nature of the observed phenomena, their features, components, and relationships.

2. Epistemological Question

How do you know what you know? and "What does it mean to say you know something?" (Dew and Foreman 2014: 19). Imagine standing in front of your bathroom mirror as you got up, how do you know that the person reflected on the mirror is you and whose father is L and mother is A. and finishing a degree in English at M. K. University of Biskra? How do you know all that and many more? Such questions belong to the realm of epistemology, the study of knowledge. Robertson (2009: 11) states that epistemology is concerned with "giving an account of knowledge". In other terms, should national curriculum include themes such as Jihad against non-Muslims? or sex education? Press reported that ISIS (aka DAESH), banned chemistry and philosophy from the schools of Raqqa as not compatible with Islamic *Sharia*. Crumley (2009: 16) identifies epistemology as "[...] the study of the nature of knowledge and justification, and this includes looking at the sources and conditions of knowledge and justification". Epistemological questions should concern what you know, who provided you with that piece of knowledge, how it is conveyed to you, the occasion of its transfer, where it is conveyed, and why it is transferred at all.

Epistemology is, therefore, concerned with paying a close look at "epistēmē" (Ancient Greek for knowledge- المعرفة) and attempts to account for what is (being) known. It is common knowledge that bees produce honey; birds fly, and bats are mammals. All these are backed by evidence and widely accepted by laypeople and academics alike. In the popular American sci-fi series *X-MEN*, superhuman mutants such as Logan, who can press long, sharp blades out of his hands to fight, are accepted for the sake of entertainment. No one can back up with scientific evidence that such men can have such superhuman power.

In fact, sometimes it is hard not to ask epistemological questions.

Dew, J. K. and Foreman, M. W.

Creswell (2007: 17) illustrates epistemology in the grid below:

Assumption	Question	Characteristics	Implications for practice [examples]
Epistemology	What is the relationship between the researcher and that being researched ?	Researcher attempts to lessen distance between him/herself and that being researched	Researcher collaborates, spends time in the field with participants, and becomes an "insider".

In education, epistemological questions such as what is the relationship between motivation and fast reading? How can motivation enhance fast reading? What needs to be done to prove the relationship between motivation and fast reading? What factors can be said to intervene in this relationship? and many more questions seek to explain what is known and its modalities, i.e., forms. Epistemology is all about what is true and how it comes to be accounted for.

3. Empirical Question

According to Punch and Oancea (2014: 377), *empirical* refers to what is "based on direct experience or observation of the world". Hence, experience/ experimentation is at the crux of empiricism. The main objective of an experimentation in research is to provide evidence of the researcher's claims that they are either true or false. Questions such as: How can you provide "hard" evidence that EFL under-achievers have poor learning habits? How can you back up the claim that if learning styles are not properly addressed, EFL learners will not be able to witness a learning curve²? An empirical question is expected to provide not only words (**interpretation**) but also numbers and percentiles (**analysis**) to support the researcher's claim(s). As a final analysis, experimentation is widely considered to be the springboard for dependable (reliable and valid) knowledge.

4. Rational Question

A rational question, which is based on sensible practical reasons to put it in Macmillan Dictionary words, attempts to address a paradigmatic query using reasonable (logical) thinking. It should be noted that since knowledge could be reached through experimentation, it could also be reached through rational thinking. A rational question emphasizes the reliance on gaining knowledge through reason, thinking that makes sense. On score of that a fourth set of questions need be addressed in a rational paradigmatic question: Do the relationships make sense? Do the results and interpretation add up? Is it reasonable to assume *that*? Do small samples reflect and represent larger populations?

Types of Paradigms: Different paradigms serve different research purposes. Lapan et al. (2011) outline four inquiry paradigms:

3.1. Positivist Paradigm: Accurate description of a phenomenon thanks to numerical measurements. The positivist paradigm is, therefore, quantitative in that it seeks to analyze collected data without engaging in interpretation of the those measurements. A positivist researcher tries hard to uncover the laws that govern phenomena all the more distancing himself/ herself from subjective influences and biases. In fact, positivist paradigm adherents are interested in exploring cause-effect relationships.

3.2. Interpretivist Paradigm: A researcher who is engaged in an interpretivist paradigm sees (social) reality (i.e., learning styles³, brain dominance⁴, motivation, and cheating on tests, etc.) from a subjective perspective. An interpretivist paradigm researcher is expected to provide his/ her own explanation of a social topic because s/he is involved in the research.

3.3. Critical Paradigm: By definition, to be *critical* means that an evaluation need be set. According to Merriam-Webster Dictionary, *critical* refers to "exercising or involving careful judgment or judicious evaluation". Thus, a critical paradigm researcher

² Learning curve refers to "the course of progress made in learning something" (Merriam-Webster)

³ **Learning styles** are learners' preferred ways of learning. Some learners prefer seeing to learn; others prefer listening and some other learners take pleasure in learning by doing.

⁴ **Brain dominance** refers to which brain hemisphere is more dominant in learning: left or right hemisphere.

is supposed to provide **feedback** (i.e., constructive comments, **تقييم بناء**) after careful consideration clearly with a view of **making a decision**. For instance, e-learning in the Algerian higher education may not be functional in its current situation because the Internet services are poor, staff and students are poorly trained to use it.

3.4. Participatory Paradigm: This paradigm "insists that a research inquiry is intertwined with politics and political agenda and that it contains an action agenda for reform that may change the lives of participants and researchers in the institution in which participants work and live" (Andrew et al. 2019: 12). Hence, a participatory paradigm consists of a *joint* perspective in which different participants collaborate to create change (or reform or innovation).

As a final analysis, a paradigm may fit the following analogy: When you wear blue glasses, you see everything blue, and if you change them-say to green glasses- everything becomes green. So are paradigms. They are also researchers' spyglasses through which they see from afar the whole scenery. Consider Max Planck⁵'s view of research: "Experiment is the only means at our disposal. Everything else is poetry or imagination". Clearly, Planck's perception of research is seen through empirical, i.e., experimental, glasses. In his view, short of conducting experimentation, research risks to be unreliable and invalid. Overall, paradigms are the rules, procedures, and philosophy that developed around a particular way of researching the world/ realities. A research need make provision to ask an **ontological** question (what is ...?), an **epistemological** question (How do you know that?), an **empirical** question (How can my claim be evidential?), and a **rational question** (Does my claim make sense?).

Research Design

By definition, *design* refers to *shape* or *form* created or drawn pending realization. It may have a French cognate *dessiner* or *dessin* (to draw and a drawing respectively), which may suggest the nature of the English word *design*. The term is widely used in circles where creativity and innovation in fashion, cars, planes, and perfumes, etc. have primacy. Such names as Coco Chanel, Yves Saint-Laurent, Nina Ricci, Dolce Gabbana, Joseph Abboud, Azzedine Alaia, Ferrari, Shiro Nakamura, Andrei Tupolev, Alec Issigonis, and Joanna Gaines are household names in creative designs that have made breakthroughs in people's lifestyles. The Arabic equivalent of *design* is **التصاميم** {التصميم}.

Research design means many things to many people. Spector (1981: 9) notes " [a]ny scientific investigation [...] must begin with some **structure** or **plan**. This structure defines the number and type of entities or *variables* to be studied and their relationship to one another" and he further indicates "such structure is termed design". Design (1984, cited in Maxwell, *ibid.*) states that research design concerns the arrangement of elements or details in a product or work of art". In more concrete terms, Gorard (2013: 8) identifies research design as " [...] a way of organising a research project or programme from its inception in order to maximise the likelihood of generating evidence that provides a convincing answer to the research questions for a given level of resource". Creswell (2007: 5) considers research design "the entire process of research from conceptualizing a

⁵ Max Planck (1858-1947) a German theoretical physicist. In 1918, he discovered energy quanta and won him Nobel Prize in Physics.

problem to writing research questions, and on to data collection, analysis, interpretation, and report writing". In short, the *actual* phases of research from beginning to end- put in a sequential order- constitute research design.

Designs are not classified randomly. Lodico et al. (2010: 26) point out "[d]esigns are often [...] classified by (1) the methods used to design the study and to collect data (for example quantitative vs. qualitative approaches), and (2) how the information is shared (for example, the dissemination of the findings). Design is, therefore, used to "denote either the general method of data collection [...] or the overall plan of conducting a research project [...]" (Vogt et. al. 2012: 340). The table below illustrates the perception of research design (drawn upon Vogt et. al.).

Methods of data collection	Overall Plan
Surveys Interviews Experiments, etc.	Methods of data collection Sampling Ethics Data coding Strategies for data analysis and interpretation

Research design is the conceptual framework or **structure** of a research project which will eventually guide research to accurately answer the research problem. Maxwell (2013:1) corroborates "A [research] design is an underlying **scheme** that governs the functioning, development, or unfolding" of an inquiry project". In other words, the concept of design is a plan thanks to which the research project is directed and redirected with a view of addressing research questions in a convincing manner. Basically, research design is presented as the *overall planning of elements prior to the execution of the research project*.

A research designer is often compared to an architect whose task is to **draw** (or design) a blueprint (or sketch plan) that the researcher intends to execute. In this case, the architect's questions would be around the area, the type of building, location, and the client's wishes. Eventually, the client receives a "blueprint", which represents lines, squares, and other geometrical patterns of the would-be building. Yin (1989, cited in De Vaus 2001: 9) sums it up "research design deals with a *logical* problem not a *logistical* problem" (*italics added*). In wide brief, the researcher ought to consider few pertinent questions prior to undertaking actual research: What is my research all about? What I am supposed to prove? Who would benefit from my research? Who is going to finance my project? How long would it take? What method(s) best fit(s) my data collection needs? and what kind of physical and moral constraints should my research overcome? etc. The designing phase of a research project is basically about gathering sufficient verifiable intelligence before taking the decision to launch a storming action. Research design is, therefore, primarily interested in the **drive, scope and focus** of the research in its broadest terms.

Research design targets research **consistency**, every single step in the research falls in straight line. In the same breath, De Vaus (2001: 9) explains "The function of research design is to ensure that the evidence obtained enables us to answer the initial question as unambiguously as possible". Hence, the relationship between variables proves to be the main focus of research design: The outcomes of the research need be reliable and valid. De Vaus (*ibid.*) puts forward the following question to elicit overall objective of research design: " What type of evidence is needed to answer the question (or test the theory) in a

convincing way?" Research design aims to establish consistency from abstract conception to final realization so that results would faithfully reflect the goals of research.

Research design is characterized by four major elements:

1. **Validity:** Collins English Dictionary suggests that the term validity derives from Latin meaning robust, which denotes the sound foundation of an object or reasoning. Research design that is characterized by validity is the one which is sound and firm because it is based on sound theory. McNeill and Chapman (2005: 9) identify validity as "the problem whether the data collected is a true picture of what is being studied". Cookson and Campbell (1979, cited in Reis et al. Brewer :3) validity refers to the best available approximation to the truth or falsity of *propositions*". Consider the following example: You go into a coffee shop and you order a cup of coffee, but the waiter brings a mint tea. How would you react to the waiter's impertinence? His service will not be considered valid because he brings a different order.

2. **Reliability:** Research design that features reliability targets to be credible and trustworthy. McNeill and Chapman (2005: 9) define reliability in the following terms "If a method of collecting evidence is reliable, it means that anybody else using this method, or the same person using it at another time, would come up with the same results". Consistency and stability in obtaining the same results by the same or another researcher on another occasion elsewhere meets the reliability criterion. Consider the following illustration: If you add two teaspoons of sugar to a glass of water, it will turn sweet. The result will be the same anywhere else in the world, any time, and by any one. The result of the sugar-water experiment is said to be reliable.

[...] no one research method or design is appropriate for answering all research questions (np)

Ledford, J.R. and Gast, D.L. (2009)

3. **Neutrality:** By definition, neutrality refers to non-alignment or *unbiasedness*. A good research design does not favor one approach or methodology over another especially as it is logical in nature.

4. **Generalizability:** A generalizable design is the one that can be applied to other disciplines from natural science and on to formal and social sciences. Differently stated, research design assumptions may well be extended to other fields.

Types of Research Design: Research designs are categorized as follows:

1. **Exploratory Research Design**

To explore" and "exploration" are usually used to refer to the discovery of virgin territories. Christopher Columbus is said to be the first European to explore the New World- the Americas in 1492. In the same line of thought, an exploratory design is undertaken "when they [i.e., researchers] have little or no scientific knowledge about the group, process, activity, or situation they want to examine but nevertheless have reason to believe it contains elements worth discovering" (Stebbins 2001: 6). You might for

example explore the implementation of artificial intelligence (AI) devices to teach English to Algerian EFL students.

2. Descriptive Research Design

According to Merriam-Webster, to *describe* is "to represent or give an account in words". In a descriptive research design, "the researcher attempts to report what already exists [...] the researcher's purpose is to understand and report the characteristics of a current or past situation" (Boudah 2010: 10). Faithful, realistic depiction of a social reality, i.e., educational in our case, (for example, test anxiety) seems to be the coin of the realm. In descriptive research designs, the focus is on one variable and its correlation. Research methods that are consistently associated with descriptive research design are surveys, correlational and qualitative (case study, grounded theory) (ibid.). Cross-sectional design (CSD) and longitudinal design (LD) make up descriptive design.

Data collected through experimentation can provide much stronger evidence of cause and effect than data collected through descriptive research.

**Shukla, P. (2010).
Essentials of Marketing
Research (part 1)**

2.1 Cross-sectional design

Cross-sectional design (CSD) is also known as survey *design*. A cross-sectional design targets the collection of data at a specific period of time. Research tools such as content analysis, diaries, official statistics, questionnaires, structured observation, and surveys (one-shot designs) are employed to collect data. CSD is concerned with multiple cases i.e., a representative sample of the population, to collect quantifiable data. The cases should be different in terms of age, gender, educational backgrounds, and economic status, etc.

2.2 Longitudinal design

Unlike CSD, longitudinal design (LD) covers an extended period of time wherein surveys and questionnaires are used to collect data. types of LD are cohort study, panel study, and retrospective study. fewer respondents and could be conducted by different researchers at different institutions on different occasions. According to Bryman (2012: 712), an LD "refers to a research design in which data are collected on a sample (of people, documents, etc.) on at least two occasions". So, the examination of the sample need be conducted over distanced periods or occasions the least of which are two. It is mainly used in medicine, economics, etc.

3. Causal [Experimental] Research Design

Literally, causal research design (CRD) is interested in identifying **the cause** of an educational "malaise" or "healthiness". According to Check and Schutt (2011: 118) a cause is "an explanation of some characteristic, attitude, or behavior of groups, individuals, or other entities (families, organizations), or events". Some EFL students' motivation gradually gives way to *demotivation*, i.e, loss of motivation, because of some teachers' severity. Therefore, teachers' tough/ rough attitudes causes the weaning of motivation. CRD targets to investigate the underlying reasons or causes why phenomena happen the way they do. This design involves the comparison of two entities in order to

define the "cause" and its effect. The goal of causal research is to answer "what if" questions to find out how to make things happen" (Remler and van Ryzin 2014: np). Consider the following question: *What if* I learn 10, 000 English words in context, would that help me read novels in English with ease and rely less on my dictionary to understand?

Cause [Independent Variable]	Effect [Dependable Year]
<i>Learn 10, 000 English words in context</i>	1. read novels with ease 2. rely less on dictionary to understand

Table 4. Cause-effect

Experimental research designs attempt to uncover the "cause" that led to the appearance of the observed phenomenon and or predict its occurrence.

Elements of Design

The eight essential elements of research design are:

Elements	Questions
Accurate purpose statement	What does the study purport itself to study?
Techniques to be implemented for collecting and analyzing research	What kind of data is sought for? What are the relevant tools that need be used to collect data?
The method applied for analyzing collected details	What are the best method(s) that can be adopted to obtain data? How best can data be analyzed?
Type of research methodology	What type of research methodology best suits the study? What is the nature of the population? How large will be the sample?
Probable objections for research	What might be an obstacle in achieving the research goals?
6. Settings for the research study	Where does the study take place? When does the study take place?
7. Timeline	How long does the study span? How much time is required to complete the study?

8. Measurement of analysis	What are the tools and techniques to analyze collected data?
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Table 5. drawn upon Essential elements of design ⁶

If researchers fail to plan their research studies, they are, in fact, planning to fail. In *The practice of social research*, Babbie (2015: 89) notes "Before you can observe and analyze, however, you need a plan. You need to determine what you are going to observe and analyze: why and how". Research is usually referred to as *systematic*, which is another term for plan. A reliable and valid research need be meticulously planned from start to finish.

Research Methodology

Methodology derives from three Ancient Greek words: **Meta** (after) **hodos** (way) and **logus** (study or research). Etymologically, methodology refers to the way that is sought to realize a research project or solve a research problem. It is, therefore, the systematic manner to go about conducting research. Research methodology is about the way that research is designed, conducted, analyzed, reported, interpreted. Conducting methodology research studies will regenerate evidence-led movements in the way that studies are designed and run. Lapan et. al. (2011: np) methodology refers to "form of inquiry" and "a way of thinking". Methodology is primarily concerned with *how* research should be carried out. According to Egon Guba (1924-2008), methodology refers to the way an inquirer should do about finding out knowledge. Sam and Aroma (2010: 19) perceive methodology as " [...] a way to systematically solve the research problem". Methodology is the "how" a research study ought to be conducted to attain happy ending, i.e., dependable and valid results.

Overall, methodology is **the scientific science of methods** that aims to study how to attain reliable and valid results. Christopher Candlin in his preface to Mickey and Gass's *Second Language Research: Methodology and Design* (2005) sums up research methodology to the "how of the research". Differently couched, research methodology could be identified as the methodical approach to research problem: *How the researchers go about identifying the research problem and all the steps necessary to reach valid and reliable results that support one's claims.*

Creswell (2007: 17) illustrates methodology in social sciences as follows:

Assumption	Question	Characteristics	Implications for practice [examples]
Methodology	What is the process of research ?	Researcher uses an inductive logic, studies the topic within its context, and uses an emerging design	Researcher works with particulars (details) before generalizations, describes in detail the contexts of the

⁶<https://www.questionpro.com/blog/research-design/>

			study, and continually revises questions from experiences in the field.
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To go back to the building example, research methodology could be similar to that which is done by a building company, which would focus on the logistical aspects of the building project such as the financial resources, time frame, materials needed, building teams, and building site nature, etc. As a final note, methodology is the science that deals with how knowledge is acquired, i.e., the way research is conducted and the justification for such choices and decisions.

Research Method

According to Bernard (2000: 8), the term *method* witnessed a shift in meaning from abstract (equated with epistemology) to concrete meanings (strategic choices and techniques). Research method is a procedural process which is basically concerned with the **actual techniques and tools to measure the variables**. Crotty (1998) defines research methods as “[t]he techniques or procedures used to collect, gather and analyse data related to some research questions or hypothesis”. Each research has its corresponding instruments to maximize the reliability and validity of the results and minimize, on the other hand, errors originating from bias or miscalculation. Lapan et al. (2011: np) point out “[r]esearchers often refer to these data collection tools, such as interviews or tests, as **methods**”. A *method* could be, therefore, understood to be the procedures, technique(s) and tool(s) that researchers use to collect data according to the principles of a given methodology. Researchers may engage in face-to-face interviews, hand out a questionnaire, analyze content, and/ or run an experiment, etc.

No one is an expert in all the methods for research.

R. Bernard

Sam and Aroma (2010: 19) spell out nine (9) research methods illustrated in the table below:

Methods	Purpose
<i>Historical</i>	To reconstruct the past objectively and accurately. Fox (1969, in Sevilla <i>et al.</i> 1992: 67) points out "Broadly, it involves any appeal to past experience to help in knowing what to do in the present and future". If you try to recreate a class of English in Algeria in the 60's with a view to investigate how students used to learn a foreign language with rudimentary tools and kits, then you are undertaking a historical research method.
<i>Descriptive</i>	To describe systematically a situation or area of interest factually and accurately. If you undertake a descriptive research method, then you are interested in the present situation to determine the its causes. Singh (2010:229) corroborates "A descriptive study describes and interprets what is". It relies on observation as a main tool of reporting the research findings. As a researcher observing

	how EFL students react to the implementation of ICTs to teach pronunciation/ spelling then reporting the findings of the observation sessions is considered a descriptive method.
<i>Development</i>	To investigate patterns and sequences of growth and/ or change as a function of time. By investigating your EFL students' achievements over a period of time seems to indicate that you are engaged in a development research method.
<i>Cause or field</i>	To study intensively the background of current status, and environmental interactions of a given social unit, an individual, group, institution, or community. When you observe, interact, and try to understand why your EFL students behave in a particular way (say, drop the third person singular 's' in the present simple), then you are conducting a field research method.
<i>Correlational</i>	To investigate the extent to which variations in one factor correspond with variations in one or more factors based on correlation coefficient. Sherri Jackson (2007 :18) defines correlation method as " a method that assess the degree of relationship between two variables". Gavin (2008: 371) notes "Correlation the observation whether the variables vary in the same direction and proportion at the same time". Researching the relationship between reading and the enhancement of writing is a correlational research method or the correlation between education and socio-economic status (i.e., income)
<i>True experimental</i>	To investigate possible cause and effect relationship by exposing one or more experimental groups to one or more treatment conditions and comparing the results to one or more control groups not receiving the treatment (random assignment being essential). Investigating how phonics and phonemic awareness contributes to the improvement of EFL students' listening and spelling skills by quantifying the findings proves that your research is experimental.
<i>Causal-comparative or ex-post facto</i>	To investigate possible cause and effect relationship by observing some existing consequence and searching back through the data for plausible casual factors. If you try to investigate why EFL tertiary students write poorly (i.e., too many spelling and grammatical mistakes) then you are undertaking an ex post facto research method
<i>Action</i>	To develop new skills or new approaches to solve problems with direct application to classroom or other applied setting. In other words, action research is specific context-based aiming to find practical solution(s) to the very problem that prevails in that specific context. Trying to discover why your late afternoon classes cause your students to feel bored and implement strategies such as introducing humor to minimize the effects of boredom may be considered action research.
<i>Hermeneutic</i>	It is generally understood to be the subjective interpretation of texts and work of arts. If you attempt to interpret poetry from your own perspective, then you are engaged in hermeneutic research method.

Research Tools/ Instruments

Every research method has its specific **data gathering tools**, which would eventually help attain valid and reliable information if judiciously and carefully utilized. The term *data* is the plural form of the Latin word *datum* meaning verbal and numerical information in context such as your name, age, preferences, and weight, etc. Punch and Oancea (2014: 376) define data as "observable information about the world; direct experience of the world". Research tools help gather and analyze data. Pathak (2008: 109) corroborates "Any researcher requires various data gathering tools- which facilitate original research investigations and observations leading to useful and valuable results".

1. Quantitative research

Methods are characterized by the manipulation of the variables, and, therefore, require tools that help control "the situation" to attain accurate and verifiable data. Tools such as surveys, observation, document screening, scales, tests, and (quasi-)experiments are what a quantitative researcher is most likely in need.

2. Qualitative Research

Qualitative research methods, which rely upon "asking questions regarding how people make meaning out of the world" (McBurney & White 2009: 220), seem to resort to such tools as interviews, focus group (i.e., discussion group), observation, document analysis, oral history or life stories.

Summary

Research follows rigorous pathways to answer research problem. These pathways are termed differently by different scholars. **Paradigm** is researchers' worldviews of the principles of research during a given period of time. Paradigms need to address four questions: (1) **ontological** (what is ...?), (2) **epistemological** (How do we know what we know?), **empirical** (how can the claim be backed by evidence?) and **rational** (does the claim make sense?). **Positivist paradigm** targets objective explanation; **interpretivist paradigm** champions subjective interpretation; **critical paradigm** favors feedback, and **participatory paradigm** consists of a joint action of stakeholders. Planning the research study is generally known as **design**; it is a step prior to taking action to conduct research. **Exploratory design** "explores" new phenomena; **descriptive design** in both its branches (cross and longitudinal) attempts to report characteristics, and **causal design** seeks to determine cause-effect relationship. **Methodology** is concerned with how research should be conducted; it is made up of one or multiple methods, i.e., modes and techniques to collect data. Each **method** (viz., historical, action, mixed-method, etc.) addresses a research topic from a particular perspective thanks to specific **instruments** to collect data. These range from observation and surveys and on to tests and experiment.

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TASKS & QUIZZES

Task One: *Are the following statements true (T) or false (F)? Insert T/F in the space provided.*

1. ____ . Methods are concerned with the modality of research, how research need be conducted.
2. ____ . Epistemology refers to the nature of knowledge.
3. ____ . Data refer only to numbers in context.
4. ____ . Tests are instrument typically used as qualitative data collection tools.
5. ____ . Critical paradigm seeks an evaluative feedback with a view of taking decisions.
6. ____ . Hermeneutic research method is a quantitative research method.

Task Two: *Read definitions on the right and come up with the term. Use the space provided.*

1. ____ . It is the study of existence, classification of existence, and how people determine if things exist or not.
2. ____ . It emphasizes subjective interpretations in the research of meanings of texts, art, culture, social phenomena and thinking.
3. ____ . It is undertaken when very little is known about a novel phenomenon.
4. ____ . It collects data to make inferences about a population of interest (universe) at one point in time.

Task Three: *Match items from Column A with those in Column B.*

A	B
1. Action research method	a. It aims to establish cause-effect relationships by controlling and manipulating events. There must an experimental group which receives the treatment and a control group.
2. Ex Post Facto	b. It collects data on several variables and wants to know about the relationships among them (Anderson, Anderson and Arsnault)
3. True Experimental research method	

4. Correlational research method	c. Teachers are urged to research the challenges facing their classes and find suitable and practical solutions. d. [...] the researcher takes the effect (dependable variable) and examines the data retrospectively to establish causes, relationships, or associations, and their meaning (Cohen et al.)
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Task Four (Scrambled statements): *Re-order the scrambled statements into a coherent paragraph by filling in the grid below.*

- a. where this can mean anything from being true, to being cogent to being legally acceptable.
- b. The technical concept of validity, as it has evolved in within educational and psychological measurement,
- c. It derives from the Latin word *validus*, meaning 'strong', 'healthy' or 'worthy' (Wiktionary, 2013).
- d. has been associated with all these meaning at one point or another.
- e. In everyday life, validity is the quality or state of being valid,

Newton, P. and Shaw, S. (2014). *Validity in Educational and Psychological Assessment*

1	2	3	4	5

Task Five: Fill in the gaps with words from the box then fill in the grid below.

experimental- variable- researcher-test-observation- Experiments-knowledge-control
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An experiment enables a researcher to __**(1)**__ a hypothesized relationship between an independent variable and a dependent __**(2)**__ by manipulating the independent variable. __**(3)**__ are usually performed in an environment that permits a high degree of __**(4)**__ of nuisance variables. Such environments rarely duplicate real-life situations, but still an experiment is a useful way of obtaining __**(5)**__. An experiment is characterized by the (1) manipulation of the __**(6)**__ of one or more independent variables, (2) use controls such as randomly assigning subjects or __**(7)**__ units to the experimental conditions, and (3) careful __**(8)**__ or measurement of one or more dependent variables.

Kirk, R. E. (2013). *Experimental Design: Procedures for Behavioral Sciences*.

1	2	3	4	5	6	7	8

Task six: *Peruse the passage then answer the question in your own words.*

In correlational research, the goal is to determine whether two or more variables are related. A variable is anything that can take on different values such as weight, time, and

height. For example, a researcher may be interested in whether age is related to weight. In this example, the researcher may discover that age is indeed related to weight because age increases, weight also increases. If a correlation between two variables is strong enough, knowing about one variable allows a researcher to make a prediction about the other variable.

Marczyk, DeMatteo, D. and Festinger, D. (2005). *Essentials of Research Design and Methodology*.

1. To what are the authors referring?
2. What is the objective of the correlational research method?
3. In what way do the authors define a variable?
4. Is the example given by the authors convincing?
5. What happens when the correlation is powerful?

Task Seven: *Discuss the citation in a three-paragraph essay.*

[...] qualitative and quantitative approaches to research differ in many ways, each with its unique features (Hancock and Algozzine 2006: 8)