

An Analytical Framework for the Five Layers of Research Methodology: Guidance for Practitioners and Scholars

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DOI : <https://doi.org/10.61796/jheaa.v3i8.1902>



Sections Info

Article history:

Submitted: May 07, 2026

Final Revised: June 26, 2026

Accepted: July 18, 2026

Published: August 11, 2026

Keywords:

Quantitative research

Qualitative research

Mixed methods

Research design

Research methodology

ABSTRACT

Objective: This article develops an analytical framework for understanding the five interconnected layers of research methodology and provides practical guidance for selecting research philosophies, approaches, designs, sampling strategies, and data-collection tools, with particular relevance to language and educational research. **Method:** The study employs a conceptual-analytical review of established research-methodology literature. The reviewed concepts are compared and organized into five layers: research purpose, philosophical paradigm, research approach, research design, and primary data-collection tools, while sampling, ethics, and the research process are treated as cross-cutting operational components. **Results:** The synthesis shows that methodological quality depends on alignment across the research objective, philosophical assumptions, logical and data approach, design, sampling strategy, and instruments. Positivist designs are primarily suited to structured measurement and causal or correlational analysis, whereas phenomenological designs are suited to contextual interpretation of human experience. Mixed-methods approaches can integrate numerical and narrative evidence when the research problem requires both forms of explanation. **Novelty:** The article proposes a practical five-layer framework that translates abstract methodological assumptions into a sequence of operational decisions that practitioners and scholars can use to evaluate methodological coherence.

INTRODUCTION

What is Research?

“Research is a process of inquiry and investigation; it is systematic, methodical and ethical. Research can help solve practical problems and increase knowledge” [1, p. 1]. The scientific method is a systematic process of collecting evidence, testing hypotheses, and developing strong theories rather than intuition or casual observation [2].

Statement of the Problem

Researchers working in fields such as English as a Foreign Language (EFL) and general education frequently encounter difficulties translating general theoretical concepts into empirical studies [3]. A common mistake is failing to coordinate research tools with underlying philosophical beliefs. For instance, one might try to assess subjective, lived experience using strict, predetermined quantitative measures, or, on the other hand, apply open-ended ethnographic methods to test direct cause-and-effect hypotheses [4], [5]. It is essential to understand how each level of the methodology relates to the next if valid, reliable, and actionable conclusions are to be obtained.

This article tries to answer the following questions:

- a. How do research philosophies (positivism vs. phenomenology) guide the choice

- of study tools?
- b. What are the five main layers of a complete research methodology?
- c. How can researchers choose the right research design, sampling methods, and data collection tools?

RESEARCH METHOD

This article uses a conceptual-analytical review rather than primary empirical data collection. The analytical corpus consists of established works on social, educational, and applied-linguistics research methodology that are already used throughout the manuscript, including sources on research paradigms, quantitative and qualitative design, mixed methods, experimental and quasi-experimental approaches, case studies, ethnography, action research, grounded theory, sampling, instrument development, and research ethics [6], [3], [5], [7].

The analysis was conducted in five stages. First, the main methodological decisions described in the literature were extracted. Second, conceptually related decisions were grouped into five layers: research purpose, philosophical paradigm, research approach, research design, and primary data-collection tools. Third, positivistic and phenomenological assumptions were compared in relation to the types of evidence they privilege [4], [8], [9]. Fourth, research designs and instruments were mapped to the purposes and forms of reasoning they are intended to support. Fifth, sampling, validity and reliability, ethics, and the general research process were examined as operational requirements that cut across the five layers [10], [1].

Because the study is conceptual and literature-based, it does not report a newly recruited participant sample or a new empirical dataset. The examples from English as a Foreign Language (EFL) and education are used illustratively to demonstrate how methodological choices can be aligned in practice.

RESULTS AND DISCUSSION

Result

The Purpose of Research

As Collis and Hussey [11] emphasize, research is conducted to achieve specific outcomes in response to gaps in existing knowledge. These core aims include:

- a. Reviewing or synthesizing the literature that exists
- b. Investigating contemporary operational or societal subjects
- c. Offering practical and scalable solutions
- d. Researching and analysing general social or organisation issues
- e. Developing new procedures, software or institutional systems
- f. Characterizing newly emerging phenomena
- g. Formulating new theoretical models

Layer 1: Research Purpose (The "Why")

Before selecting tools or gathering data, a researcher must clarify the study's main objective [11], [12]. Research goals generally fall into four categories:

Exploratory: Analytical, predictive and descriptive research looks into new, vague or poorly studied problems; its aim is not to arrive at definite conclusions but to identify initial patterns, clarify the concepts involved and establish priorities for future research [13].

Descriptive: Describes, profiles, and categorizes specific phenomena by identifying “what” is happening across frequencies, baseline counts, and demographics [2].

- a. Analytical: It goes beyond describing baseline facts to explain “why” or “how” a phenomenon occurs by analyzing root causes and relationships between variables [5].
- b. Predictive: Based on established cause-effect relationships to predict future trends, behaviors, or operational results [11].

The philosophy of research is grounded in the researcher's assumptions about truth, reality, and human behavior [4], [14]. The epistemological and ontological assumptions made by the researcher determine how data should be collected and interpreted.

Layer 2: Positivistic vs. Phenomenological Paradigms

Positivistic Paradigm (Scientific / Objectivist)

As a positivist, the assumption is that reality is objective, unique, and exists independently of human perception [9]. Positivism, rooted in the natural sciences, posits that human behavior and social phenomena can be analyzed using empirical observation, rigorous measurement, and mathematical analysis. Researchers working within this paradigm are required to be highly detached from participants to reduce personal bias and identify universal laws of cause and effect [6].

Phenomenological Paradigm (Interpretive / Subjectivist)

The approach known as phenomenology (or interpretivism) holds that reality is subjective, made up of multiple aspects and constructed within the human mind [8], [15]. Instead of looking for universal laws, phenomenological researchers seek to grasp the rich variety of people's inner experiences, their values, and the specific contextual details. From this perspective, the researcher's involvement is not a drawback but rather an essential link in the process of interpreting meaning.

Layer 3: Research Approach (The Logic and Strategy)

The third layer structures how data, practical applications, and logical reasoning are organized [5].

By Data Type

- a. Quantitative: Looks at numbers, uses statistics, checks scales, and builds models [6].
- b. Qualitative approach: non-numerical representations such as spoken words, transcripts from observations, underlying values, and detailed experiences are examined [3].
- c. Mixed Methods Research: A research approach that combines both quantitative and qualitative methods within a single study to collect, analyze, and integrate both numerical and narrative data for a more complete understanding [16].

By Practical Application

Basic (Pure) Research: It is motivated by a desire for theoretical knowledge and is aimed at expanding fundamental understanding even if there is no immediate practical result.

Applied research is designed specifically to deal with a serious, real-world operational, clinical, or social problem within a well-defined setting [11].

By Logical Reasoning

- a. Deductive reasoning (top-down) starts with a general theory that is already established, leads to the formulation of specific hypotheses, involves gathering empirical sample data, and then tests the data in order to either confirm or reject the original theory [9].
- b. Inductive reasoning (bottom-up) involves carrying out an open-ended and unstructured data collection, spotting patterns that emerge, and then developing a brand-new theoretical framework based on the findings [17].

Layer 4: Research Design. The research design forms the structural basis for collecting evidence [7]. In general, the different designs are associated with either a positivistic or a phenomenological paradigm.

1. Positivistic research designs (quantitative and objective) are intended to measure growth, test interventions, and assess performance by means of structured metrics:

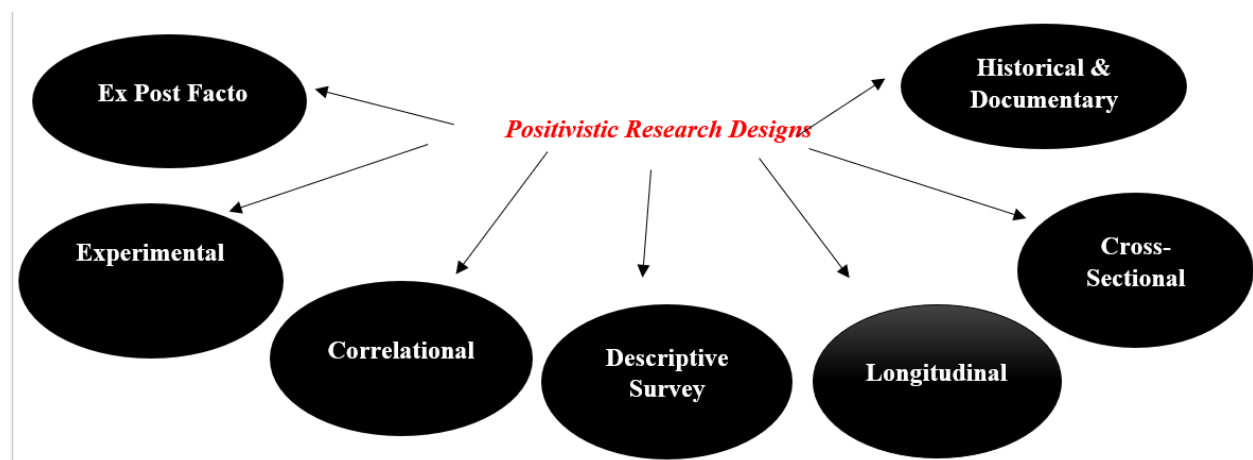


Figure 1. Overview of Positivistic Research Designs

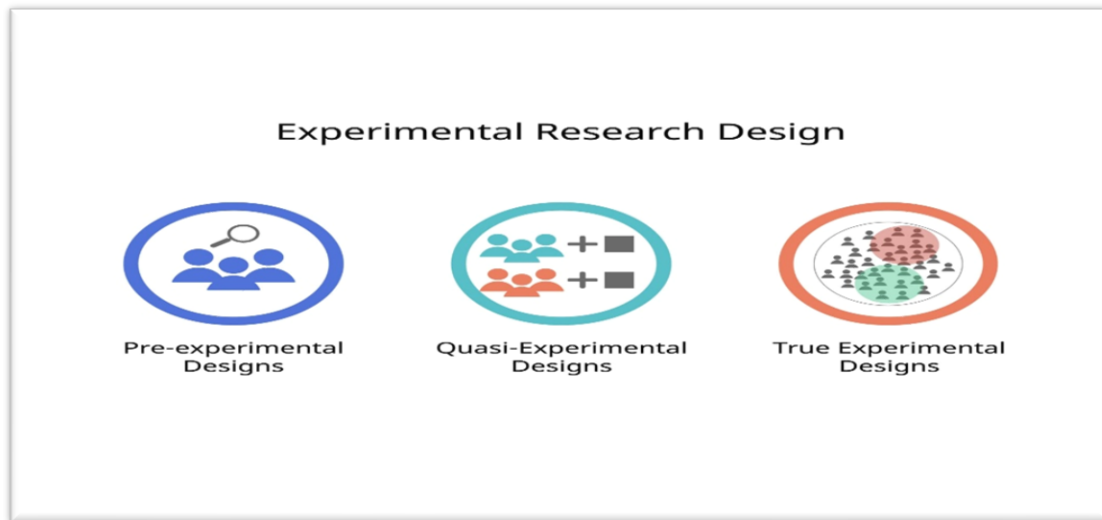
Experimental designs involve manipulating the independent variables in controlled situations in order to ascertain direct causality [18], [6].

Example of an EFL study: To test whether Virtual Reality (VR) improves vocabulary retention, participants were randomly divided into two groups, Group A consisting of those who learned the restaurant vocabulary within a VR simulation and Group B comprising those who learned the same vocabulary using flashcards, after which the same post-test was administered.

Primary Categories of Experimental Designs

The way in which experimental designs were first categorized was established by Campbell and Stanley [18] in their important book *Experimental and Quasi-Experimental*

Designs for Research; the designs were grouped according to the extent of internal control, more specifically in respect to the presence of random assignment and control groups.



Pre-Experimental Designs

Pre-experimental designs provide very little or no control over extraneous variables and are mainly employed for preliminary or exploratory studies [19].

A one-shot case study involves a single group being given a treatment (X) and then measured (O).

- a. In the one-group pretest-posttest design, the same group is given a measurement before (O₁) and after (O₂) they have been exposed to the treatment.
- b. A static-group comparison involves comparing a group that has been treated with a group that has not been treated, without carrying out random assignment or having baseline pretests.

Quasi-Experimental Designs

Experimental designs which involve a comparison group or more than one measurement do not have participants randomly assigned to the different conditions [20]. Such designs are frequently used in situations where randomization would be impractical or unethical.

- a. The design in question is known as a non-equivalent control group design: it involves comparing an experimental group with a control group by taking measurements both before and after the treatment, without randomly assigning participants [18].
- b. The interrupted time-series design involves following one group at various points in time both before and after an intervention in order to examine changes in the trend [21].

True Experimental Designs

True experimental designs are the criterion by which causal relationships are established since they make use of both random assignment and a control group in order to isolate the treatment effect [22].

- a. Posttest-Only Control Group Design: Participants are randomly assigned to either a treatment or control group and measured only after the intervention
- b. In the pretest-posttest control group design, both groups are assessed before and after the treatment to make sure that they are equivalent at the start.
- c. The Solomon Four-Group Design involves using both the posttest-only and pretest-posttest arrangements among four groups (two of which are given the treatments and two of which act as controls) in order to determine whether pretesting has an effect on the posttest results.
- d. Research which is conducted ex post facto looks at the possible causes or effects of a phenomenon that has already taken place by comparing two or more groups that differ naturally with respect to a pre-existing independent variable. [19]
- e. Example of an ELT study: A comparison being made between the achievement in reading comprehension on the part of EFL (English as a Foreign Language) students who had attended bilingual primary schools and those who had attended monolingual primary schools. (The students' school background existed in the past and could not be altered).
- f. Survey designs that are correlational and analytical involve measuring the relationships between two or more variables that occur naturally, without manipulating them [2].

Example for EFL: A survey of 100 learners was carried out to measure their speaking anxiety on a scale from 1 to 5, and these scores were compared with their grades in the formal speaking exam in order to check whether lower anxiety is directly correlated with greater fluency.

- g. Descriptive survey designs collect baseline numbers from large groups. This helps profile populations [5].
- h. A department head administers a multiple-choice questionnaire to 200 university students in order to obtain precise figures on the number of hours per week that the students spend using language-learning mobile applications.
- i. Study using longitudinal designs by following the same group over a long period of time in order to see how they change over that time [3].

An example from the EFL study involved monitoring 30 high school students over a period of four years and assessing their grammatical accuracy every six months in order to trace the development of their mastery of verb tenses over time.

- j. The use of cross-sectional designs involves gathering data from various subgroups at one point in time in order to deduce the course of development [9].
Example for EFL: In order to compare the natural differences between first-year, second-year and third-year adult learners, pronunciation accuracy is tested on them all on the same day, without the need for multi-year tracking.

Historical and documentary research involves examining past records, documents, and archival materials in order to understand, interpret, and explain past phenomena or historical events. [23].

Example of ELT: Examining archives of 19th-century English grammar textbooks and colonial curricula in order to find out how the Grammar-Translation Method was historically put into practice in secondary schools.

Phenomenological Research Designs (Qualitative & Subjective)

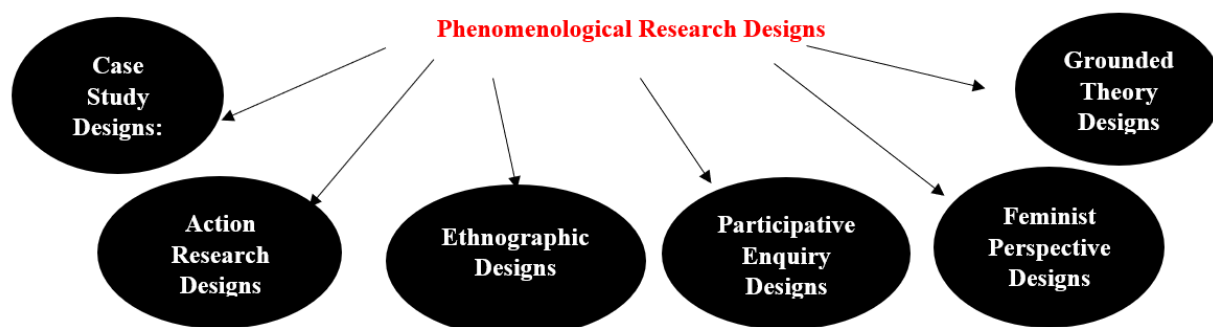


Figure 2. Overview of Phenomenological Research Designs

These approaches seek to understand motivation, cultural norms, and human experiences:

- a. Case study designs involve carrying out a detailed examination of a single entity or of a well-defined system [7], [24].

It provides a descriptive case study of the detailed daily routines, arrangements of seating, and sequence of lessons of an outstanding teacher in Seoul.

Illustrative case study: This shows how one teacher incorporated Task-Based Language Teaching (TBLT) into a classroom with limited resources.

A study based on actual experience outlines the real-world difficulties, technical faults, and the users' resistance when a school introduced an automated AI grading system.

- b. Explanation of a case study: The motivation theory (for example, Dörnyei's L2 Motivational Self System) was used to explain why one group of adult immigrants made rapid progress while another group failed to do so [3].
- c. A reflective and iterative approach in which practitioners deal with problems in their own professional setting [25], [26].
- d. A teacher sees that students become frozen when asked to speak, so he or she introduces peer discussions of five minutes' duration, watches to see how students get involved, changes the topics of the prompts, and then carries out this process again until their confidence has improved.
- e. Ethnographic Designs (Participant Observation): Involves the researcher staying within a cultural environment over a long period of time in order to pick up the unspoken norms [27].

An example of EFL would be spending six months living abroad and observing a rural classroom, taking daily field notes on matters such as social hierarchy, body

language, and the dynamics of peer correction.

- f. Participative Enquiry Designs: These involve working together with practitioners, the participants functioning as co-researchers in the evaluation and reform of their common environment [28].

A leading instructor works with three other teachers who act as co-researchers in order to jointly analyze, discuss, and redesign their lesson plans for phrasal verbs.

- g. Feminist Perspective Designs: This involves an analysis of power structures, gender biases, and marginalization as they exist within social institutions or educational materials [29].

Example for EFL: Examine EFL textbooks and interview female students in order to find out how the gender stereotypes contained in the reading passages affect the students' confidence when speaking up in class.

- h. Grounded theory approaches make use of qualitative data that has been systematically collected in order to develop a completely new theoretical model without having any prior hypotheses [17], [30].

Example of an EFL interview: A framework called "The EFL Confidence Rebuild Model" was developed based on interviews with 25 adult learners who had overcome serious foreign language anxiety.

Layer 5: Primary Data-Collection Tools

After the research blueprint has been defined, certain instruments are chosen in order to obtain the primary data.

A. Questionnaires

Questionnaires collect data in a consistent way by asking everyone the same set of questions [31].

Administration Modes

- a. Electronic: Available through web forms or by using email links.
- b. By post (printed): Sent directly to the physical addresses of the respondents.
- c. Delivery and collection are carried out by personal delivery and the item is then collected when the work is completed.
- d. The telephone service was provided verbally and was recorded either on paper or in digital form.
- e. Interview-administered (face-to-face or in groups): The interviewer reads it aloud in structured situations.

Question Formats

- 1. Here are some open questions which allow the respondents to give their insights in their own words and thus produce a great deal of qualitative information (for example, "*Please describe the brand that you prefer and explain why*").
- 2. For closed questions, a set of predefined alternative answers (such as categorical options, Likert rating scales, or matrix grids) should be provided in order to allow for quick quantification and statistical analysis.
 - a. Important Rules for Making Questionnaires [31]

- b. In order to ensure clarity of objectives, it is necessary to specify the exact data requirements prior to drawing up the questions in order to avoid gathering irrelevant data.
- c. Validity and reliability mean that the questions should accurately measure the construct in question (validity) and yield consistent results if they are repeated under similar conditions [10].
- d. Arrange the questions in a logical order, beginning with general and non-offending ones before progressing to more specific or difficult ones.
- e. Strategy for response rate: To reduce low return rates, include professional cover letters, make the purpose of the study clear, and provide reasonable incentives.
- f. For a pilot study, test the instruments on a small group beforehand in order to spot any unclear wording, technical faults, or bad options before the full launch.

B. Interviews

Interviews gather verbal data across varying degrees of structure [32], [33]:

- a. Structured: The interviewer asks set questions and reads them word for word in a neutral tone. This works much like an oral questionnaire.
- b. Semi-structured: Based on a standard outline of main topics, yet permitting the ability to adjust, reorganize, or add more in-depth questions according to the course of the conversation.
- c. Unstructured discussions: are informal and open-ended, involving a detailed exploration of a particular topic as the conversation progresses.

C. Focus Groups

Focus groups consist of interactive and facilitated conversations between a small number of chosen participants [34]. The discussions within the group usually lead to a greater degree of insight, the exchange of shared experiences, and the expression of differing opinions which might not appear during one-on-one interviews.

When the researcher should intervene:

- a. If one member dominates the discussion
- b. If the group strays from the topic
- c. To encourage quieter members
- d. To resolve conflicts

D. Participant Observation Roles

As categorized by Gill and Johnson [35], participant observation can be structured around four distinct roles based on disclosure and level of engagement:

Table 1. Science and Education Publishing

Role	Disclosure	Researcher Participation	Example
Complete Participant	Hidden (Covert)	Full engagement with group	Covertly joining an operational team to study leadership styles.

Role	Disclosure	Researcher Participation	Example
Complete Observer	Hidden (Covert)	Zero engagement	Detached, secret observation of shoppers in a retail store.
Observer as Participant	Known (Overt)	Superficial / Occasional engagement	Watching team-building exercises with minimal involvement.
Participant as Observer	Known (Overt)	Full engagement	Fully taking part in daily workplace routines while openly recording observations.

Types of Observational Data

Observers collect three distinct levels of field notes [35]:

- Main observations: Detailed, real-time accounts of actual events, actions, and exact dialogue.
- Notes from secondary observations: Interpretive statements, analytical remarks, and initial assessments concerning the behaviours observed.
- Experiential Data: Notes which reflect the researcher's internal state, personal reactions, emotional changes, and possible biases during the field study.

Sampling Strategies

Table 2. Probability Sampling (Researcher has control) [1]

Method	Explanation
Simple Random	Selection at random from a choice of subjects.
Systematic Stratified	Selecting at numbered intervals (e.g., every 5th person). Sampling within particular sections based on percentage of total group characteristics.
Cluster	Surveying a particular cluster of the subject group.

Table 3. Non-Probability Sampling (Little control)

Method	Explanation
Convenience	Sampling those most convenient and immediately available.
Voluntary	Sample is self-selecting; they come forward in response to an appeal.
Purposive Snowball	Using judgment to choose people that best meet objectives. Building a sample through informants; one person suggests another.

Method	Explanation
Event	Using opportunity presented by a particular event.
Sampling	
Time Sampling	Sampling at different times or days that may be significant.

Table 4. Ethical Considerations [1]

Issue	Explanation
Privacy	Rights of privacy of individuals must be respected.
Voluntary Participation	Rights to withdraw partially or completely from the process.
Consent	Obtaining consent and avoiding deception of participants.
Confidentiality	Maintaining confidentiality and anonymity of data.
Misleading People	Is it ethical to conceal research purposes to gain access?
Publishing Results	Findings may damage or embarrass participants. Avoid falsifying data.

Checklist for Ethical Research:

- Will the process of carrying out the research cause harm to the participants?
- Will the results be likely to do harm to anyone else?
- Is it contrary to established research practices?
- Is it your action that is in breach of the professional standards of conduct?

The Stages of the Research Process [1]

- Stage 1:** Establish a general field of interest; discuss with supervisor
- Stage 2:** Undertake preliminary & background reading
- Stage 3:** Narrow ideas to a workable topic and research proposal
- Stage 4:** Preparation of information gathering 'tools' and data gathering
- Stage 5:** Collation, analysis and interpretation of research data
- Stage 6:** Write first draft of research project report
- Stage 7:** Revision and re-write; submit dissertation

Discussion

The five-layer synthesis indicates that research methodology should be treated as a connected decision system rather than as a collection of independent techniques. Research purpose defines what the study is expected to accomplish, while philosophical assumptions determine what counts as credible evidence and how that evidence should be interpreted [4], [14]. The research approach then translates these assumptions into deductive, inductive, quantitative, qualitative, or mixed-methods logic, and the research design provides the structure through which evidence is generated [6], [16].

A major practical implication of the framework is that the choice of a questionnaire, interview, focus group, observation schedule, or other tool should occur only after the preceding layers have been clarified. Structured instruments are useful when constructs can be specified and measured consistently, whereas interviews,

ethnographic observation, and other qualitative tools are more appropriate when the aim is to investigate meaning, context, experience, or interaction [31], [32], [27]. This reinforces the manuscript's central argument that a technically well-designed instrument cannot compensate for a mismatch between the research question and the study's philosophical or design assumptions.

The distinction between positivistic and phenomenological research is therefore most useful as a guide to methodological coherence. Experimental and quasi-experimental designs are appropriate when the researcher seeks to estimate intervention effects under different levels of control [18], [20], whereas case study, action research, ethnography, participative enquiry, and grounded theory provide different routes for investigating bounded cases, professional practice, cultural settings, collaborative change, and theory generation [7], [25], [28], [17]. Mixed-methods research provides an additional integrative option when the research problem requires both numerical patterns and contextual interpretation [16].

The framework also shows that sampling, ethics, and quality assurance are not isolated end-stage procedures. Sampling decisions influence the scope of inference and the relevance of the evidence, while validity, reliability, piloting, informed consent, privacy, voluntary participation, confidentiality, and responsible reporting affect the credibility and ethical defensibility of the entire study [10], [1]. For practitioners and scholars in EFL and education, applying these checks at each layer can reduce common design inconsistencies and make the final research process more transparent, auditable, and aligned with the original research objectives [33], [34], [35].

Taken together, the results suggest that the proposed framework is most valuable as a practical diagnostic guide. It does not replace specialized methodological procedures for particular designs; rather, it helps researchers ask whether the logic of the study remains consistent from the initial purpose through the selection of evidence, participants, and data-collection instruments. This layered view is especially useful for novice researchers who may otherwise select familiar tools before clarifying the methodological assumptions that justify their use.

CONCLUSION

Fundamental Finding: The analysis demonstrates that a coherent research methodology can be understood through five connected layers: research purpose, philosophical paradigm, research approach, research design, and primary data-collection tools. The framework shows that methodological credibility depends on maintaining alignment across these layers while integrating appropriate sampling, quality assurance, ethical safeguards, and research-process decisions. **Implication:** Practitioners and scholars can use the five-layer framework as a diagnostic checklist before data collection to ensure that research questions, philosophical assumptions, reasoning, design, sampling, and instruments support one another. **Limitation:** The article is conceptual and illustrative rather than a systematic review or empirical validation study; therefore, the framework summarizes methodological relationships represented in the selected

literature without testing its effectiveness across disciplines or research settings. **Future Research:** Subsequent studies should evaluate the framework empirically with novice and experienced researchers, examine its usefulness across disciplinary contexts, and test whether its use improves the clarity, consistency, and defensibility of research proposals and completed studies.

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