EDUCATIONAL RESEARCH

A Beginner’s Guide to Concepts, Methods, and Practice

A practical study guide for education students, teachers, and new researchers

Topics include research questions, literature reviews, research designs, sampling, data collection, analysis, ethics, and proposal writing.

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1. Meaning and purpose of educational research

Educational research is a systematic, evidence-based process for studying teaching, learning, schools, educational policies, learners, and other aspects of education. It asks focused questions, gathers relevant information, analyses evidence, and reports findings transparently.

For example, a researcher may investigate whether weekly formative quizzes are associated with improved mathematics achievement, how students experience online learning, or why some learners have difficulty attending school.

Why it matters

• Helps teachers evaluate and improve classroom practice.

• Identifies barriers to learning, participation, and achievement.

• Provides evidence for school leadership and education policy.

• Tests ideas rather than relying only on assumptions or anecdotes.

• Builds knowledge that other researchers can examine or extend.

2. Main characteristics and purposes

• **Systematic:** follows a planned sequence of steps.

• **Evidence-based:** uses relevant observations, documents, measurements, or accounts.

• **Focused:** investigates a clearly defined problem or question.

• **Transparent:** explains methods and limitations so readers can judge the findings.

• **Ethical:** respects participants' rights, dignity, privacy, and safety.

• **Critical:** considers alternative explanations and the possibility of error.

Educational research may be exploratory (understanding a little-known issue), descriptive (documenting what is happening), explanatory (examining why or how something happens), evaluative (judging a programme), or improvement-oriented (testing a change in practice).

3. Types and approaches

Quantitative research

Uses numerical data and statistical analysis to describe patterns, compare groups, test relationships, or estimate effects. Common tools include structured questionnaires, achievement tests, attendance records, and experiments. It is useful when variables can be measured meaningfully.

Qualitative research

Uses non-numerical data—such as interviews, observations, student work, and documents—to understand experiences, meanings, interactions, and context. It is useful for questions about how people experience or interpret educational situations.

Mixed-methods research

Combines quantitative and qualitative approaches in one study. For example, test scores may show whether performance changed, while interviews help explain how students experienced the intervention.

Approach	Typical question	Possible data
Quantitative	How much? How often? Is there a relationship?	Scores, counts, rating scales
Qualitative	How? Why? What is the experience like?	Interviews, field notes, documents
Mixed methods	What pattern exists, and how can it be explained?	Numerical and textual evidence

4. The educational research process

• **Step 1 — Identify a problem:** choose an issue that is important, researchable, and appropriately narrow.

• **Step 2 — Review literature:** examine relevant studies, theories, and credible reports.

• **Step 3 — Set objectives and questions:** specify what the study aims to find out.

• **Step 4 — Choose a design:** select methods that fit the question and practical constraints.

• **Step 5 — Plan ethics and access:** obtain permissions, consent, and any required institutional approval.

• **Step 6 — Select participants and tools:** define the population, sample, and data collection procedures.

• **Step 7 — Collect data:** follow the plan consistently and keep secure records.

• **Step 8 — Analyse evidence:** use suitable statistical or qualitative procedures.

• **Step 9 — Interpret findings:** relate results to the question and existing literature; avoid unsupported claims.

• **Step 10 — Report and share:** explain methods, findings, limitations, and practical implications.

> The process is often iterative: a pilot study or early analysis may show that a question or procedure needs refinement.

5. Research problem, questions, and hypotheses

A research problem describes a specific issue or gap that needs investigation. A good problem is clear, relevant, feasible, ethically manageable, and supported by enough background evidence to justify the study.

Example topic: Use of formative assessment in secondary-school mathematics.

Possible problem statement: Teachers may use different formative assessment practices, but the relationship between students' reported use of these practices and their mathematics performance in a particular school context is not yet clear.

Research question: What relationship exists between students' reported frequency of formative assessment and their mathematics test scores?

Objective: To examine the relationship between reported formative assessment frequency and mathematics test scores among the selected students.

Hypothesis (for a quantitative study): There is an association between reported formative assessment frequency and mathematics test scores.

A hypothesis is a testable prediction, not a required feature of every study. Qualitative studies often use open-ended research questions instead.

6. Literature review and conceptual framework

A literature review critically synthesizes what reliable sources already say about a topic. It should compare findings, identify agreements and disagreements, assess methods and limitations, and show the gap the proposed study will address. It is more than a list of article summaries.

A practical literature-review workflow

• Choose keywords and related terms; search scholarly databases and trusted institutional sources.

• Set inclusion criteria, such as topic, population, date range, and publication type.

• Record each source's question, design, sample, findings, and limitations.

• Group sources by themes or debates rather than discussing them one by one.

• Cite sources consistently and distinguish other authors' claims from your own interpretation.

A conceptual framework shows the key concepts or variables and the expected relationships among them. It may be based on an established theory, prior research, or a clearly explained model developed for the study.

7. Research designs and methods

Survey: collects standardized responses from a sample to describe opinions, practices, or characteristics. Questionnaire wording and sampling affect the quality of results.

Experimental design: introduces an intervention and compares outcomes under controlled conditions. Random assignment, where feasible, can strengthen causal inference.

Quasi-experimental design: evaluates an intervention without full random assignment, often using existing classes or schools. Researchers must consider baseline differences and other explanations.

Correlational design: examines relationships between variables without necessarily changing them. Correlation alone does not establish causation.

Case study: investigates a bounded case—such as one school, classroom, or programme—in depth using multiple sources of evidence.

Ethnographic approach: studies practices, interactions, and culture in a setting, often through sustained observation and fieldwork.

Action research: practitioners investigate their own practice through cycles of planning, acting, observing, and reflecting to improve a local situation.

Document or content analysis: examines texts, curricula, policies, student work, or other records using a defined analytical procedure.

8. Population, sampling, and participants

The **population** is the group to which a study is concerned. The **sample** is the subset actually studied. Researchers should define both clearly and explain how participants were selected.

Common sampling methods

• **Simple random sampling:** each eligible population member has a known, equal chance of selection.

• **Stratified sampling:** divides the population into meaningful groups and samples within each group.

• **Cluster sampling:** selects naturally occurring groups, such as schools or classes.

• **Convenience sampling:** recruits participants who are readily available; practical but often less representative.

• **Purposive sampling:** selects information-rich participants relevant to a qualitative question.

• **Snowball sampling:** participants help identify other eligible participants; useful for some hard-to-reach groups.

Sample size should be justified by the research design, population, expected variation or effect, analysis plan, and practical constraints. A larger sample does not automatically correct biased selection or poor measurement.

9. Data collection tools

• **Questionnaires:** efficient for collecting standardized responses; pilot-test unclear or leading items.

• **Interviews:** structured, semi-structured, or open-ended conversations that explore participants' views.

• **Observations:** systematic records of behaviour, interaction, or classroom practice.

• **Tests and assessments:** measure defined knowledge or skills; check alignment, scoring, and suitability.

• **Focus groups:** guided group discussions that can reveal shared views and differences.

• **Documents and records:** curricula, policy documents, attendance data, assignments, or school records, subject to permission and privacy safeguards.

Validity concerns whether an interpretation or measure is appropriate for its intended purpose. Reliability concerns consistency. In qualitative work, credibility, reflexivity, rich description, and a transparent audit trail can strengthen trustworthiness.

10. Data analysis and interpretation

Quantitative analysis

Begin by checking data quality, missing values, and coding. Descriptive statistics—such as frequencies, percentages, means, and standard deviations—summarize the data. Inferential methods may estimate relationships or group differences when their assumptions and design are appropriate. Report effect sizes and uncertainty where possible, not only whether a result is statistically significant.

Qualitative analysis

Prepare accurate transcripts or field notes, read the material carefully, code relevant segments, group codes into categories or themes, examine patterns and exceptions, and support interpretations with appropriately anonymized evidence. Explain how the analysis was conducted and how the researcher's position may have shaped it.

Interpretation checklist

• Does the analysis answer the research question?

• Are conclusions supported by the data?

• Have alternative explanations and contradictory evidence been considered?

• Are limitations, uncertainty, and context acknowledged?

• Are recommendations proportionate to the strength of the evidence?

11. Ethics and research quality

Educational research may involve children, students, teachers, grades, or sensitive records. Ethical practice is essential throughout the project.

• **Informed consent:** explain purpose, procedures, risks, benefits, and voluntary participation in understandable language.

• **Children and young people:** follow applicable rules for parental/guardian permission and age-appropriate assent; do not assume one permission replaces all others.

• **Voluntary participation:** make clear that declining or withdrawing will not bring unfair penalties.

• **Privacy and confidentiality:** collect only necessary information, remove identifiers where appropriate, restrict access, and store data securely.

• **Power relationships:** take special care when teachers recruit their own students or when participation may feel compulsory.

• **Minimize harm:** consider embarrassment, stigma, academic consequences, and risks from disclosure.

• **Honesty:** do not fabricate, falsify, plagiarize, or selectively misrepresent findings.

• **Permissions:** obtain required school, institutional, ethics-review, and data-access approvals before collection.

> Follow the applicable institutional requirements and local laws. This guide is educational information, not a substitute for an ethics committee's instructions.

12. Writing a research proposal

A research proposal explains what will be studied, why it matters, and how the study will be conducted. Institutions differ, so always follow the required format.

• Title: concise and specific.

• Introduction/background: establish the context and significance.

• Problem statement: define the issue or knowledge gap.

• Purpose, objectives, questions, and hypotheses (where appropriate).

• Literature review and conceptual/theoretical framework.

• Methodology: design, setting, population, sample, tools, procedures, and analysis plan.

• Ethical considerations and data management.

• Scope, delimitations, and limitations.

• Work plan/timeline and budget, if required.

• References and appendices, including draft instruments where appropriate.

A strong methodology explains not only what will be done, but why the chosen methods fit the research questions.

13. Example research outline

Working title: Students' Experiences of Formative Assessment in Secondary-School Mathematics

Purpose: To understand how students experience formative assessment and how they perceive its usefulness for learning.

Questions: (1) Which formative assessment practices do students report encountering? (2) How do students describe the feedback they receive? (3) What aspects do they believe help or hinder learning?

Design: A small qualitative case study in one selected school, subject to permission and feasibility.

Participants: A purposively selected group of eligible students; the final number would be justified by the study scope and the depth of information needed.

Data collection: Semi-structured interviews and, if approved, relevant classroom documents or observations.

Analysis: Thematic analysis, documenting coding decisions and considering evidence that does not fit initial themes.

Ethics: Obtain required approvals and consent/assent, avoid recruiting pressure, anonymize reporting, and protect recordings and transcripts.

Limitations: Findings from one school may not transfer to other settings; accounts may be influenced by memory or social desirability.

> This is an illustrative outline, not a completed study or a claim that any findings have been obtained.

14. Key terms

Term	Meaning
Variable	A characteristic that can take different values, such as attendance or test score.
Operational definition	A precise description of how a concept will be observed or measured.
Population	The full group a study concerns.
Sample	The participants or cases included in the study.
Bias	A systematic influence that can distort selection, measurement, analysis, or interpretation.
Triangulation	Using multiple sources, methods, or perspectives to examine an issue.
Pilot study	A small preliminary test of procedures or instruments.
Limitation	A constraint that affects interpretation or the reach of conclusions.
Generalizability	The extent to which findings may apply beyond the studied sample or setting.
Reflexivity	Critical consideration of how the researcher's position and decisions affect the study.

Suggested introductory reading

• Creswell, J. W., & Creswell, J. D. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. Consult the edition available through your library.

• Cohen, L., Manion, L., & Morrison, K. Research Methods in Education. Consult the edition available through your library.

• American Educational Research Association (AERA): consult its official guidance on ethical standards and responsible educational research.

• Use peer-reviewed journals, university library databases, and relevant education ministry or institutional publications. Verify publication details and cite the exact edition or document you actually consult.

Final reminder

Good educational research begins with a clear, worthwhile question; uses methods suited to that question; protects participants; analyses evidence carefully; and reports findings with honesty and appropriate caution.