research nest

LESSON 4 · RESEARCH NEST COURSE

Research Questions and Study Design

> *If two students study the same topic but ask different questions, should they use the same method?*

From a gap in the literature to a question you can actually answer

Methods follow questions, not the other way round

LEARNING OBJECTIVES

By the end of this lesson you can…

Output: a one-page study-design and ethics plan, ready to show your supervisor.

- Refine a broad topic into a focused, answerable research question
- Decide whether your question needs a hypothesis
- Match your question type to a suitable method
- Define your variables or key concepts so others could repeat your work
- Plan ethical research and get approval before collecting data from people

KEY IDEA

What makes a research question strong?

A strong question is focused, answerable with evidence you can collect, and worth asking.

Focused

Names a specific population, place, text or time. "Teenagers in our school", not "people".

Answerable

You can gather evidence in your time, budget and skills. No question needs a lab you do not have.

Clear terms

Key words can be defined or measured. "Concentration" becomes a 1–5 rating or a described experience.

Arguable and useful

Not a yes/no fact you could look up. It needs analysis and connects to your gap.

Adapted from: GMU Writing Center, How to Write a Research Question; USC Libraries, Choosing a Research Problem

KEY IDEA

Hypotheses: only where they fit

A hypothesis is a testable prediction. Many excellent projects do not need one.

Does your question need a hypothesis?

Question type	Example	Hypothesis?
Causal / experimental	Does fertiliser concentration change cress growth rate?	Yes: a testable prediction
Relational / correlational	Is screen time related to sleep length?	Optional: a directional expectation
Descriptive	How do Grade 9 students commute to school?	No: describe, do not predict
Interpretive / historical	How did one newspaper frame the 1918 flu?	No: argue an interpretation
Exploratory / design	Can we build a low-cost sensor that logs noise?	No: use requirements and tests

KEY IDEA

Match the question to the method

Each method suits a different kind of question.

Method	Best for questions about…	Discipline example
Survey / measurement	How common, how much, how related	Psychology: sleep and mood
Interviews	Experiences, reasons, meanings	Sociology: why students join clubs
Experiment	Cause and effect under control	Biology: light colour and growth
Textual / archival	How texts or records portray something	History: council minutes
Secondary data / design	Existing data; building and testing	Economics; engineering prototype

Adapted from: USC Libraries, Types of Research Designs; Khan Academy

WORKED EXAMPLE · STEP 1 INVENTED EXAMPLE

Noor refines her question

Adds a place and population: three study spaces, our students

Says "related to", not "affects": her design cannot prove cause

Second part opens space for students' own explanations

BEFORE

Does noise affect concentration?

AFTER

In our school's three main study spaces, how is measured background noise related to students' self-reported concentration, and how do students explain where they choose to study?

WORKED EXAMPLE · STEP 2 INVENTED EXAMPLE

Design: mixed methods, non-experimental

A short survey with noise readings, plus a few interviews. Optional expectation: noisier spaces go with lower ratings.

Noor's variables and concepts, defined so someone else could repeat them

Variable / concept	Definition	How measured
Background noise	Sound level during a study session	Phone app, dB(A), approximate; 3 readings
Self-reported concentration	How well a student felt they focused	Single survey item, 1 (very poor) to 5 (very good)
Study space	Where the session took place	Library quiet zone, study hall or cafeteria corner
Reasons for choosing a space	Students' own explanations	Short semi-structured interviews (about 6)

WORKED EXAMPLE · STEP 3 INVENTED EXAMPLE

Noor plans ethics before collecting data

1. **Supervisor approval**
   Ms Rahman reviews the plan, survey and interview questions first
2. **Information sheet**
   Plain-language purpose, what is involved, how data are stored
3. **Consent and assent**
   Student agreement; parental permission where the school requires it
4. **Minimal risk, anonymous**
   No names on surveys, no voice recordings, no sensitive questions
5. **Right to withdraw**
   Anyone can stop or skip questions at any time, with no penalty

Informed by: US HHS OHRP, Research with Children FAQs; Society for Science, ISEF Human Participants rules

FRAMEWORK

Decision guide: from question to design

Then ask: is it feasible here, and is it ethical? If not, loop back and reshape the question.

What kind of question is it?	
What is happening? How common? How do people describe it?	→ Descriptive: survey, observation or interviews. No hypothesis needed.
Are two things related?	→ Correlational: measure both, report association. Optional expectation; no causal claims.
Does changing X cause a change in Y?	→ Experiment: control, random assignment, hypothesis. Check feasibility and ethics.
How do texts or records portray it? Can we build it?	→ Textual/archival analysis with a thesis, or design cycle with requirements and tests.

COMMON MISTAKES

Common mistakes and how to fix them

Mistake	Why it is a problem	Fix
"Noise causes poor focus" (survey)	Correlation cannot rule out other explanations	Say "is associated with"; list confounders
Unmeasurable terms ("productivity", "better")	Nobody can tell what you actually measured	Write an operational definition
Question too broad ("all teenagers")	Impossible to sample or answer in weeks	Narrow place, people, time or texts
Collecting data before approval	May harm or identify participants	Get supervisor sign-off, consent and assent first
Forcing a hypothesis onto a history question	Distorts an interpretive project	Use a thesis or guiding question instead

GUIDED PRACTICE

Guided practice: redesign a weak question

20 minutes, in pairs. Paper or laptop only; do not collect any data today.

1. **Pick a starter (2 min)**
   "Do phones affect students?" or your own topic question
2. **Refine (5 min)**
   Add place, people, time; check it is focused and answerable
3. **Route it (4 min)**
   Use the decision guide; decide if a hypothesis fits
4. **Define (5 min)**
   List 2–3 variables or concepts and how you would capture each
5. **Ethics scan (4 min)**
   Who is involved? What approval, consent and anonymity are needed?

MODEL RESPONSE INVENTED EXAMPLE

Model response: the phone question

STARTER: "DO PHONES AFFECT STUDENTS?"

RQ: Among Grade 10 students at our school, how is self-reported evening phone use related to self-reported sleep duration on school nights?[1] Design: anonymous one-week survey; optional expectation that more phone use goes with less sleep.[2] Variables: phone use = minutes after 9 pm (from screen-time tool); sleep = hours, from a daily log.[3] Ethics: supervisor approval, information sheet, assent plus parental permission if required, no names, skip or withdraw any time.[4]

Focused population; "related to" fits a correlational design

Non-experimental

Operational definitions anyone could repeat

Approval before any data collection

TEMPLATE

Your one-page study-design and ethics plan

Check your school's own policy: rules for minors and review boards vary.

- [ ] Research question: focused place, people/texts and time; answerable in your time frame
- [ ] Question type: descriptive, correlational, experimental, interpretive or design
- [ ] Hypothesis, expectation, thesis or requirements: which one fits, and why
- [ ] Method(s) and sample or sources: who or what, how many, how chosen
- [ ] Variables or concepts: each with a definition and how you will capture it
- [ ] Ethics: approval, information sheet, consent/assent/permission, anonymity, withdrawal
- [ ] Limitations you can already predict, and supervisor signature and date

KNOWLEDGE CHECK

Knowledge check and next step

Next: finish your one-page plan and get supervisor sign-off before Lesson 6.

Which question is most focused and answerable for a four-week project?

A Why do people get distracted? **B** How do screens affect society?

C How do our Grade 9s rate distraction in two study rooms? **D** Is noise bad?

How did two newspapers portray a 1960s protest? This history question needs...

A A hypothesis **B** A thesis and textual analysis **C** A student survey **D** Random assignment

A survey finds sleep and mood scores are linked. Which claim is justified?

A Sleep causes better mood **B** They are associated in this sample **C** Mood causes sleep

Name two things that must be in place before you survey other students.

SOURCES & FURTHER READING

Sources and further reading

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