# What Is a Research Design | Types, Guide & Examples

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A research design is a strategy for answering your research question using empirical data. Creating a research design means making decisions about:

- Your overall research objectives and approach
- The type of research design you'll use
- Your sampling methods or criteria for selecting subjects
- Your data collection methods
- The procedures you'll follow to collect data
- Your data analysis methods

A well-planned research design helps ensure that your methods match your research aims and that you use the right kind of analysis for your data.

You might have to write up a research design as a standalone assignment, or it might be part of a larger research proposal or other project. In either case, you should carefully consider which methods are most appropriate and feasible for answering your question.

**Table of contents**

1. Step 1: Consider your aims and approach
2. Step 2: Choose a type of research design
3. Step 3: Identify your population and sampling method
4. Step 4: Choose your data collection methods
5. Step 5: Plan your data collection procedures
6. Step 6: Decide on your data analysis strategies
7. Frequently asked questions about research design

## Step 1: Consider your aims and approach

Before you can start designing your research, you should already have a clear idea of the research question you want to investigate.

> **Research question example**
>
> How can teachers adapt their lessons for effective remote learning?

There are many different ways you could go about answering this question. Your research design choices should be driven by your aims and priorities—start by thinking carefully about what you want to achieve.

The first choice you need to make is whether you'll take a **qualitative or quantitative** approach.

| | |
|---|---|
| • Understand subjective experiences, beliefs, and concepts<br>• Gain in-depth knowledge of a specific context or culture<br>• Explore under-researched problems and generate new ideas | • Measure variables and describe frequencies, averages, and correlations<br>• Test hypotheses about relationships between variables<br>• Test the effectiveness of a new treatment, program or product |

Qualitative research designs tend to be more flexible and inductive, allowing you to adjust your approach based on what you find throughout the research process.

> **Qualitative research example**
>
> If you want to generate new ideas for online teaching strategies, a qualitative approach would make the most sense. You can use this type of research to explore exactly what teachers and students struggle with in remote classes.

Quantitative research designs tend to be more fixed and deductive, with variables and hypotheses clearly defined in advance of data collection.

> **Quantitative research example**
>
> If you want to test the effectiveness of an online teaching method, a quantitative approach is most suitable. You can use this type of research to measure learning outcomes like grades and test scores.

It's also possible to use a mixed-methods design that integrates aspects of both approaches. By combining qualitative and quantitative insights, you can gain a more complete picture of the problem you're studying and strengthen the credibility of your conclusions.

### Practical and ethical considerations when designing research

As well as scientific considerations, you need to think practically when designing your research. If your research involves people or animals, you also need to consider research ethics.

- How much time do you have to collect data and write up the research?
- Will you be able to gain access to the data you need (e.g. by travelling to a specific location or contacting specific people)?
- Do you have the necessary research skills (e.g. statistical analysis or interview techniques)?
- Will you need ethical approval?

At each stage of the research design process, make sure that your choices are practically feasible.

# Step 2: Choose a type of research design

Within both qualitative and quantitative approaches, there are several types of research design to choose from. Each type provides a framework for the overall shape of your research.

## Types of quantitative research designs

Quantitative designs can be split into four main types. **Experimental** and **quasi-experimental** designs allow you to test cause-and-effect relationships, while **descriptive** and **correlational** designs allow you to measure variables and describe relationships between them.

**Experimental**

- Used to test causal relationships
- Involves manipulating an independent variable and measuring its effect on a dependent variable
- Subjects are randomly assigned to groups
- Usually conducted in a controlled environment (e.g. a lab)

**Quasi-experimental**

- Used to test causal relationships
- Similar to experimental design, but without random assignment
- Often involves comparing the outcomes of pre-existing groups
- Often conducted in a natural environment

**Correlational**

- Used to test whether (and how strongly) variables are related
- Variables are measured without influencing them

**Descriptive**

- Used to describe characteristics, averages, trends, etc
- Variables are measured without influencing them

With descriptive and correlational designs, you can get a clear picture of characteristics, trends and relationships as they exist in the real world. However, you can't draw conclusions about cause and effect (because correlation doesn't imply causation).

**Correlational design example**

You could use a correlational design to find out if the rise in online teaching in the past year correlates with any change in test scores.

But this design can't confirm a causal relationship between the two variables. Any change in test scores could have been influenced by many other variables, such as increased stress and health issues among students and teachers.

Experiments are the strongest way to test cause-and-effect relationships without the risk of other variables influencing the results. However, their controlled conditions may not always reflect how things work in the real world. They're often also more difficult and expensive to implement.

**Experimental design example**

In an experimental design, you could gather a sample of students and then randomly assign half of them to be taught online and the other half to be taught in person, while controlling all other relevant variables.

By comparing their outcomes in test scores, you can be more confident that it was the method of teaching (and not other variables) that caused any change in scores.

## Types of qualitative research designs

Qualitative designs are less strictly defined. This approach is about gaining a rich, detailed understanding of a specific context or phenomenon, and you can often be more creative and flexible in designing your research.

The table below shows some common types of qualitative design. They often have similar approaches in terms of data collection, but focus on different aspects when analyzing the data.

| |
|---|
| **Case study** |
| • Detailed study of a specific subject (e.g. a place, event, organization, etc).<br>• Data can be collected using a variety of sources and methods.<br>• Focuses on gaining a holistic understanding of the case. |
| **Ethnography** |
| • Detailed study of the culture of a specific community or group.<br>• Data is collected by extended immersion and close observation.<br>• Focuses on describing and interpreting beliefs, conventions, social dynamics, etc. |
| **Grounded theory** |
| • Aims to develop a theory inductively by systematically analyzing qualitative data. |
| **Phenomenology** |
| • Aims to understand a phenomenon or event by describing participants' lived experiences. |

# Step 3: Identify your population and sampling method

Your research design should clearly define who or what your research will focus on, and how you'll go about choosing your participants or subjects.

In research, a **population** is the entire group that you want to draw conclusions about, while a **sample** is the smaller group of individuals you'll actually collect data from.

## Defining the population

A population can be made up of anything you want to study—plants, animals, organizations, texts, countries, etc. In the social sciences, it most often refers to a group of people.

For example, will you focus on people from a specific demographic, region or background? Are you interested in people with a certain job or medical condition, or users of a particular product?

The more precisely you define your population, the easier it will be to gather a representative sample.

> **Population example**
>
> If you're studying the effectiveness of online teaching in the US, it would be very difficult to get a sample that's representative of all high school students in the country.
>
> To make the research more manageable, and to draw more precise conclusions, you could focus on a narrower population—for example, 9th-grade students in low-income areas of New York.

## Sampling methods

Even with a narrowly defined population, it's rarely possible to collect data from every individual. Instead, you'll collect data from a sample.

To select a sample, there are two main approaches: probability sampling and non-probability sampling. The sampling method you use affects how confidently you can generalize your results to the population as a whole.

- Sample is selected using random methods
- Mainly used in quantitative research
- Allows you to make strong statistical inferences about the population

- Sample selected in a non-random way
- Used in both qualitative and quantitative research
- Easier to achieve, but more risk of research bias

Probability sampling is the most statistically valid option, but it's often difficult to achieve unless you're dealing with a very small and accessible population.

For practical reasons, many studies use non-probability sampling, but it's important to be aware of the limitations and carefully consider potential biases. You should always make an effort to gather a sample that's as representative as possible of the population.

### Case selection in qualitative research

In some types of qualitative designs, sampling may not be relevant.

For example, in an ethnography or a case study, your aim is to deeply understand a specific context, not to generalize to a population. Instead of sampling, you may simply aim to collect as much data as possible about the context you are studying.

In these types of design, you still have to carefully consider your choice of case or community. You should have a clear rationale for why this particular case is suitable for answering your research question.

For example, you might choose a case study that reveals an unusual or neglected aspect of your research problem, or you might choose several very similar or very different cases in order to compare them.

## Step 4: Choose your data collection methods

Data collection methods are ways of directly measuring variables and gathering information. They allow you to gain first-hand knowledge and original insights into your research problem.

You can choose just one data collection method, or use several methods in the same study.

### Survey methods

Surveys allow you to collect data about opinions, behaviours, experiences, and characteristics by asking people directly. There are two main survey methods to choose from: questionnaires and interviews.

- More common in quantitative research
- May be distributed online, by phone, by mail or in person
- Usually offer closed questions with limited options
- Consistent data can be collected from many people

- More common in qualitative research
- Conducted by researcher in person, by phone or online
- Usually allow participants to answer in their own words
- Ideas can be explored in-depth with a smaller group

## Observation methods

Observations allow you to collect data unobtrusively, observing characteristics, behaviours or social interactions without relying on self-reporting.

Observations may be conducted in real time, taking notes as you observe, or you might make audiovisual recordings for later analysis. They can be qualitative or quantitative.

- Systematically counting or measuring
- Categories and criteria determined in advance

- Taking detailed notes and writing rich descriptions
- All relevant observations can be recorded

## Other methods of data collection

There are many other ways you might collect data depending on your field and topic.

| **Media & communication** |
| --- |
| Collecting a sample of texts (e.g. speeches, articles, or social media posts) for data on cultural norms and narratives |

| **Psychology** |
| --- |
| Using technologies like neuroimaging, eye-tracking, or computer-based tasks to collect data on things like attention, emotional response, or reaction time |

| **Education** |
| --- |
| Using tests or assignments to collect data on knowledge and skills |

| **Physical sciences** |
| --- |
| Using scientific instruments to collect data on things like weight, blood pressure, or chemical composition |

If you're not sure which methods will work best for your research design, try reading some papers in your field to see what kinds of data collection methods they used.

## Secondary data

If you don't have the time or resources to collect data from the population you're interested in, you can also choose to use secondary data that other researchers already collected—for example, datasets from government surveys or previous studies on your topic.

With this raw data, you can do your own analysis to answer new research questions that weren't addressed by the original study.

Using secondary data can expand the scope of your research, as you may be able to access much larger and more varied samples than you could collect yourself.

However, it also means you don't have any control over which variables to measure or how to measure them, so the conclusions you can draw may be limited.

## Step 5: Plan your data collection procedures

As well as deciding on your methods, you need to plan exactly how you'll use these methods to collect data that's consistent, accurate, and unbiased.

Planning systematic procedures is especially important in quantitative research, where you need to precisely define your variables and ensure your measurements are reliable and valid.

### Operationalization

Some variables, like height or age, are easily measured. But often you'll be dealing with more abstract concepts, like satisfaction, anxiety, or competence. Operationalization means turning these fuzzy ideas into measurable indicators.

If you're using **observations**, which events or actions will you count?

> **Example**
>
> To measure student participation in an online course, you could record the number of times students ask and answer questions.

If you're using **surveys**, which questions will you ask and what range of responses will be offered?

> **Example**
>
> To measure teachers' satisfaction with online learning tools, you could create a questionnaire with a 5-point rating scale.

You may also choose to use or adapt existing materials designed to measure the concept you're interested in—for example, questionnaires or inventories whose reliability and validity has already been established.

### Reliability and validity

Reliability means your results can be consistently reproduced, while validity means that you're actually measuring the concept you're interested in.

| |
|---|
| • Does your measure capture the same concept consistently over time?<br>• Does it produce the same results in different contexts?<br>• Do all questions measure the exact same concept? |
| • Do your measurement materials test all aspects of the concept?<br>• Does it correlate with different measures of the same concept? |

For valid and reliable results, your measurement materials should be thoroughly researched and carefully designed. Plan your procedures to make sure you carry out the same steps in the same way for each participant.

If you're developing a new questionnaire or other instrument to measure a specific concept, running a pilot study allows you to check its validity and reliability in advance.

### Sampling procedures

As well as choosing an appropriate sampling method, you need a concrete plan for how you'll actually contact and recruit your selected sample.

That means making decisions about things like:

- How many participants do you need for an adequate sample size?
- What inclusion and exclusion criteria will you use to identify eligible participants?
- How will you contact your sample—by mail, online, by phone, or in person?

If you're using a probability sampling method, it's important that everyone who is randomly selected actually participates in the study. How will you ensure a high response rate?

If you're using a non-probability method, how will you avoid bias and ensure a representative sample?

### Data management

It's also important to create a data management plan for organizing and storing your data.

Will you need to transcribe interviews or perform data entry for observations? You should anonymize and safeguard any sensitive data, and make sure it's backed up regularly.

Keeping your data well-organized will save time when it comes to analyzing it. It can also help other researchers validate and add to your findings.

## Step 6: Decide on your data analysis strategies

On its own, raw data can't answer your research question. The last step of designing your research is planning how you'll analyze the data.

### Quantitative data analysis

In quantitative research, you'll most likely use some form of statistical analysis. With statistics, you can summarize your sample data, make estimates, and test hypotheses.

Using descriptive statistics, you can summarize your sample data in terms of:

- The **distribution** of the data (e.g. the frequency of each score on a test)
- The **central tendency** of the data (e.g. the mean to describe the average score)
- The **variability** of the data (e.g. the standard deviation to describe how spread out the scores are)

The specific calculations you can do depend on the level of measurement of your variables.

Using inferential statistics, you can:

- Make estimates about the population based on your sample data.
- Test hypotheses about a relationship between variables.

Regression and correlation tests look for associations between two or more variables, while comparison tests (such as t-tests and ANOVAs) look for differences in the outcomes of different groups.

Your choice of statistical test depends on various aspects of your research design, including the types of variables you're dealing with and the distribution of your data.

## Qualitative data analysis

In qualitative research, your data will usually be very dense with information and ideas. Instead of summing it up in numbers, you'll need to comb through the data in detail, interpret its meanings, identify patterns, and extract the parts that are most relevant to your research question.

Two of the most common approaches to doing this are thematic analysis and discourse analysis.

**Thematic analysis**

- Focuses on the content of the data
- Involves coding and organizing the data to identify key themes

**Discourse analysis**

- Focuses on putting the data in context
- Involves analyzing different levels of communication (language, structure, tone, etc)