

A free guide from Elevate STEM

Pathway to Research

How to go from "I think I like biology" to a finished research project. This is the path most of us followed the first time around.

1 Pick a broad topic you actually care about

Something like biomedical engineering or cell biology. Research takes months, and when you get stuck (you will), it's your interest in the topic that keeps you going.

2 Read a lot of papers in that area

Say you chose biomedical engineering. You might read a paper on a new technology that lowers healthcare costs by making diagnoses more accurate, improving treatment, or making medical devices cheaper. Read widely, then pick the handful of papers you liked most.

3 Look for gaps

Go back through those papers and look for questions they leave open. A gap like that is often the seed of a really good project, and it's where your research question comes from.

4 Form a hypothesis

Once you have a question, do a focused literature review: read more papers about that specific question and take notes on each. By the end you'll have enough background to write a hypothesis.

5 Run your experiments

Now you need data to test your hypothesis. A few ways to get it:

- In a lab, with a mentor at a university or research institute.
- At home, as long as it's safe and doesn't need special protective gear or equipment.
- With computer simulations, which model what would happen in a real wet-lab experiment. They're pretty accurate, though not always.

6 Analyze what you found

Use quantitative methods like statistics, or qualitative ones, to see whether your data supports your hypothesis.

If it doesn't, that's okay! Every scientist gets results they didn't expect. Use what you learned to adjust your hypothesis and try different variables. Some of the most interesting findings come from exactly this.

7 Share it

Write it up as a research paper, a poster if you're entering a competition, or even a video. Then go celebrate.

Good luck with your research! — The Elevate STEM team