# Posgrado en ciencias en ingeniería electrónica
# Research Seminar - 101

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# Contents I

# Why do you research

- We first discuss the aims of research and what readers will expect of any research report.
- Then we focus on how to find a research question whose answer is worth your time and your readers' attention.
- How to find and use information from sources to back up your answer.
- Then how to plan, draft, and revise your report so your readers will think your answer is based on sound reasoning and reliable evidence.[1]

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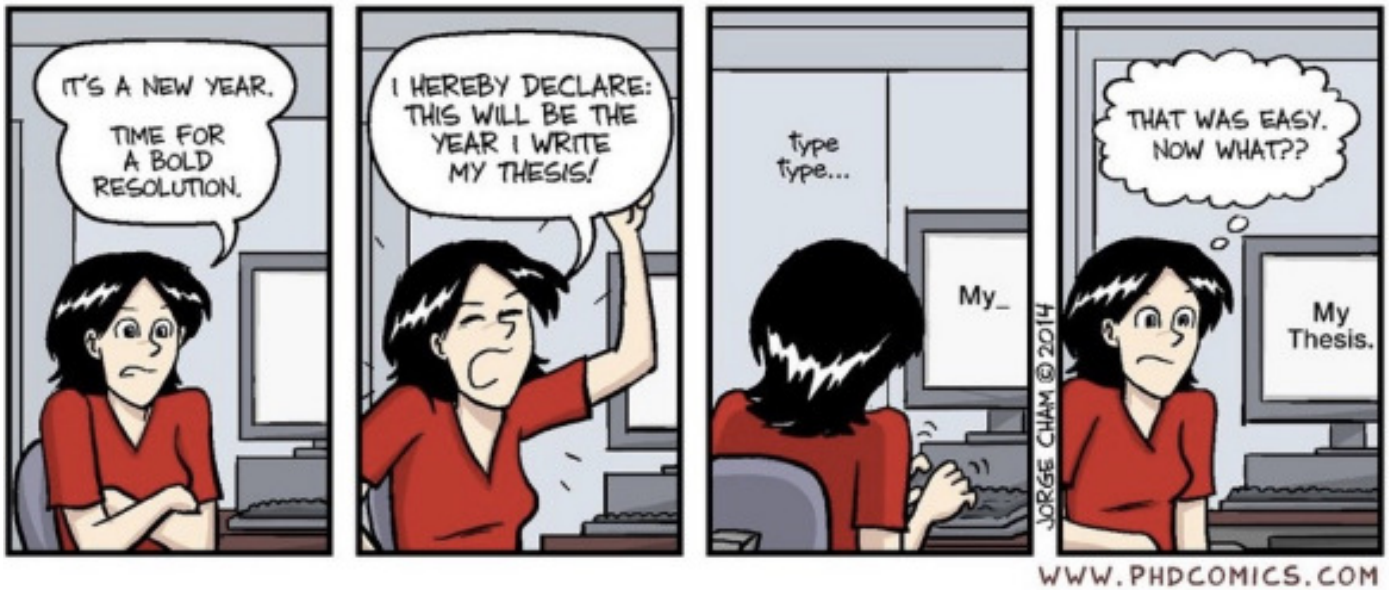
You must report your research in writing when others will accept your claims only after they study how you reached them. In fact, reports of research tell us most of what we can reliably believe about our world



- As you learn to do your own research, you also learn to use -and judge- that of others.
- We try to explain to others, not just why we believe our claim, but why they should too, we must do more than **just state an opinion and describe our feelings**.
- It must rest on shared facts that readers accept as truths.
- Your success as a researcher thus depends not just on how well you gather and analyze data, but on how clearly you report your reasoning so that your readers can test and judge it before making your claims part of their knowledge and understanding.

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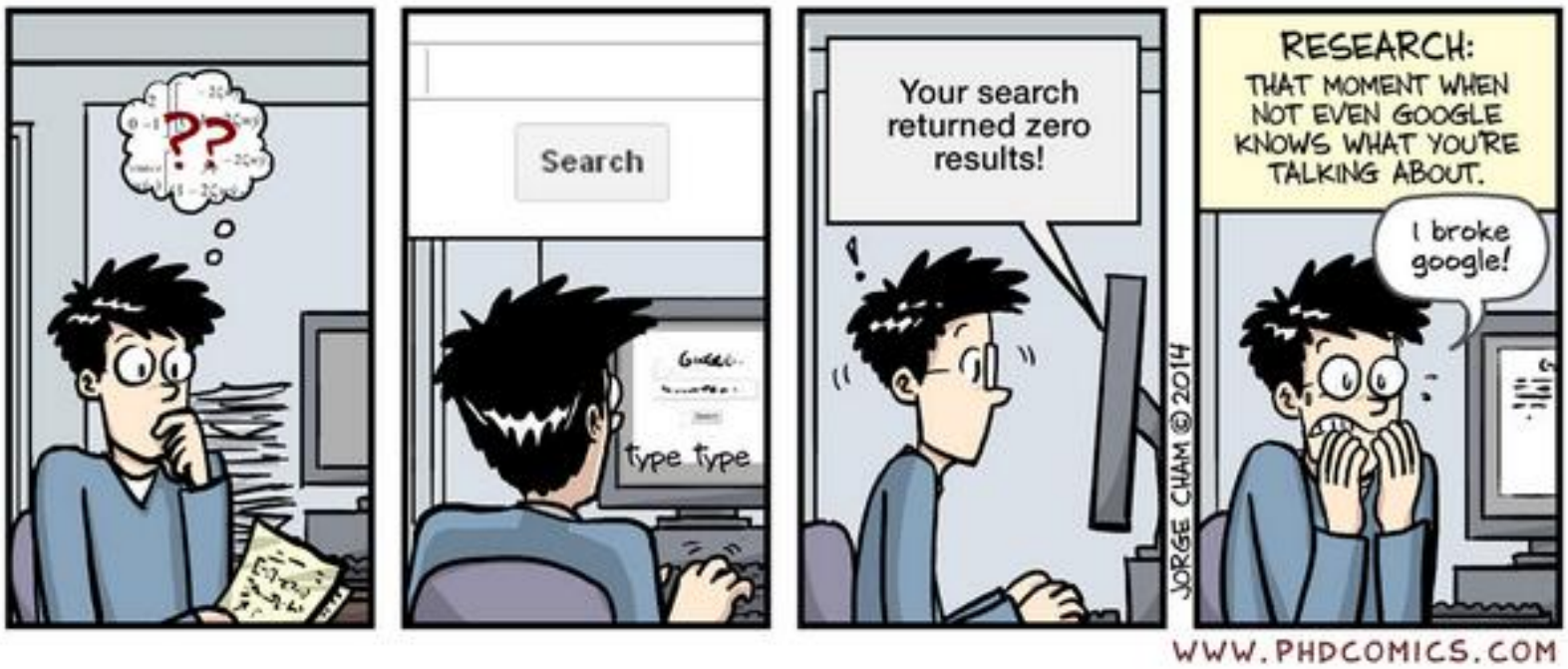
# My work

So, you can judge how closely your thinking tracks that of an experienced resercher by describing your project in a sentence like this:

1. I am working in the topic X
2. Because i want to find out Y
3. So that I can help other understand Z

# Our a,b,c ...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Search
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Your search returned zero results!
RESEARCH:
THAT MOMENT WHEN NOT EVEN GOOGLE KNOWS WHAT YOU'RE TALKING ABOUT.
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# Not all questions are good enough

**It is hard to see how an answer would help us think about any larger issue worth understanding**

# Three kind of questions that researchers ask

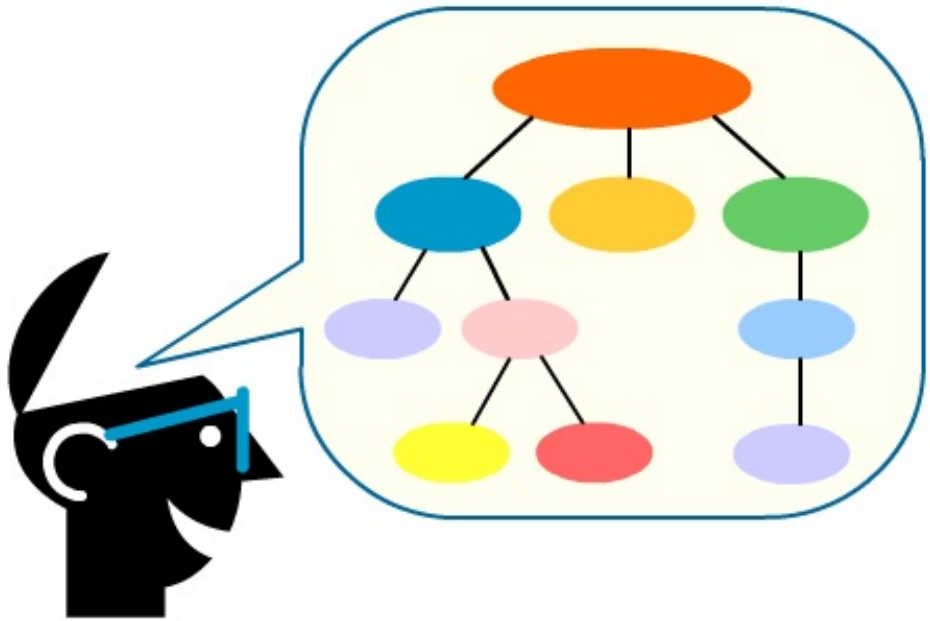
Readers expect to answer one of the most common kind of questios. The most common questions in academic works are conceptual.
The ones most common in the professional are practical.

(a) Conceptual

(b) Practical

# Conceptual

A question could be classified as conceptual when your answer helps reader to understand some issue.



# Conceptual

Researchers in the humanities and the social and natural sciences work mostly on conceptual questions, such as How did Shakespeare's political environment influence his plays? What caused the extinction of most large North American mammals? What are comets made of?

# Practical

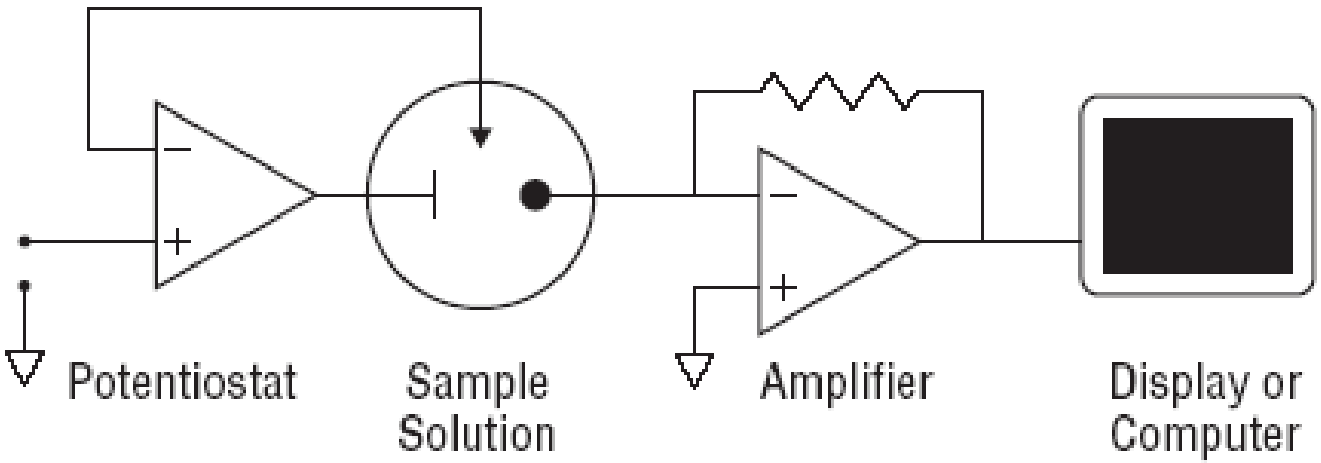
A question could be classified as practical when your answer tells readers what to **do** to change or fix some trouble.

# Practical

Practical questions are most common outside the academic world. In academic fields such as health care and engineering[1, Page 19].

# Applied questions

Often, we know we must do something to solve a practical problem, but before we can know what that is, we must do research to understand the problem better. We can call that kind of research applied. With this middle kind of question, the third step raises a question whose answer is not the solution to a practical problem, but only a step toward it.



# Section 2: Hypothesis

1. Ask a question worth answering,
2. find an **“answer”** that you can support with good arguments
3. find reliable evidence to support your arguments
4. draft a report that makes a good case for your answer and
5. revise that draft until readers will think you met the preview goals.

# Find a question in you topic

# Question your topic

Do this not just once, early on, but throughout your project. Ask questions as you read, especially how and why.

- Ask how the topic fits into a larger context (historical, social, cultural, geographic, functional, economic, and so on).
- Ask questions about the nature of the thing itself, as an independent entity
- Turn positive questions into a negative ones.

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- Ask speculative question
- Ask What if? questions: How would things be different if your topic never existed, disappeared, or were put into a new context?
- Ask questions that reflect disagreements with a source.
- Ask questions analogous to those that others have asked about similar topics.
- Look for questions that other researchers pose but don't answer. Many journal articles end with a paragraph or two about open questions, ideas for more research, and so on. You might not be able to do all the research they suggest, but you might carve out a piece of it.
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# Evaluate your questions

Not all answers are equally useful, so evaluate your questions and scrap those that are unlikely to yield interesting answers. Reconsider when the following is true.

- You can answer the question too easily.
- You can't find good evidence to support the answer
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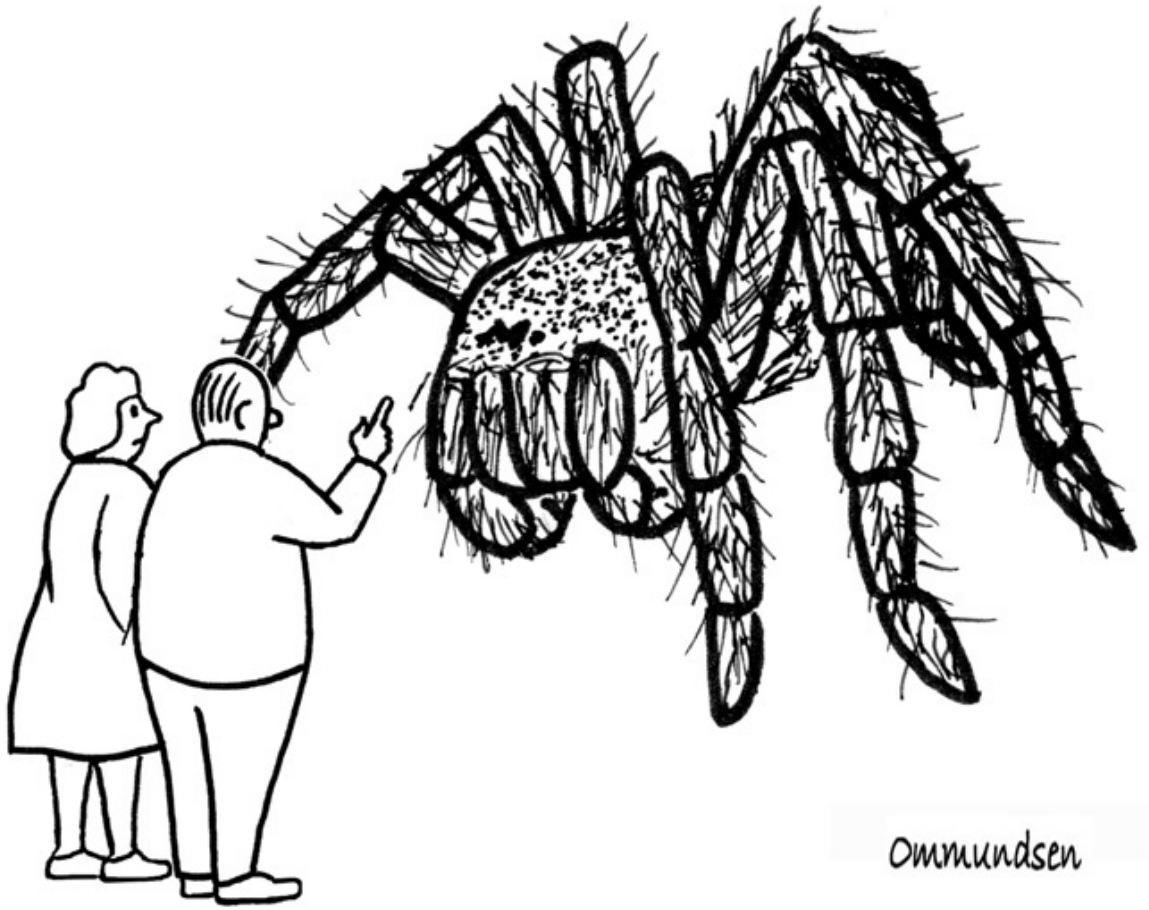
## Try this first

Before you get deeper in to your project, try one more step. Once you have a question, imagine some plausibly answers. Don't worry whether they'are right. That comes later.
Look for two or three plausibly answers. Even if you prefer one, you can improve it by testing it against the others, and in any event, you can't show that an answer is right if you can't also show why others are wrong. Putting a foggy idea into words is the best way to clarify it, or to discover that you can't.




**“I’ve narrowed it to two hypotheses: it grew or we shrunk.”**

If one answer seems promising, call it your working hypothesis. Even the most tentative working hypothesis helps you to think ahead, especially about the kind of evidence that you'll need to support it. Will you need

- Numbers?,
- quotations?,
- observations?,
- images? or
- historical facts?

More important, what kind of evidence would disprove your hypothesis? Answer those question and you know what kind of data watch for and keep.

In fact, until you have a hypothesis, you can't know whether data you collect are relevant to any question worth asking


If you can't imagine any working hypothesis, reconsider your question. Find one you can answer. That cost time in the short run, but it may save you from a failed project.

# Beware the risk in a working hypothesis

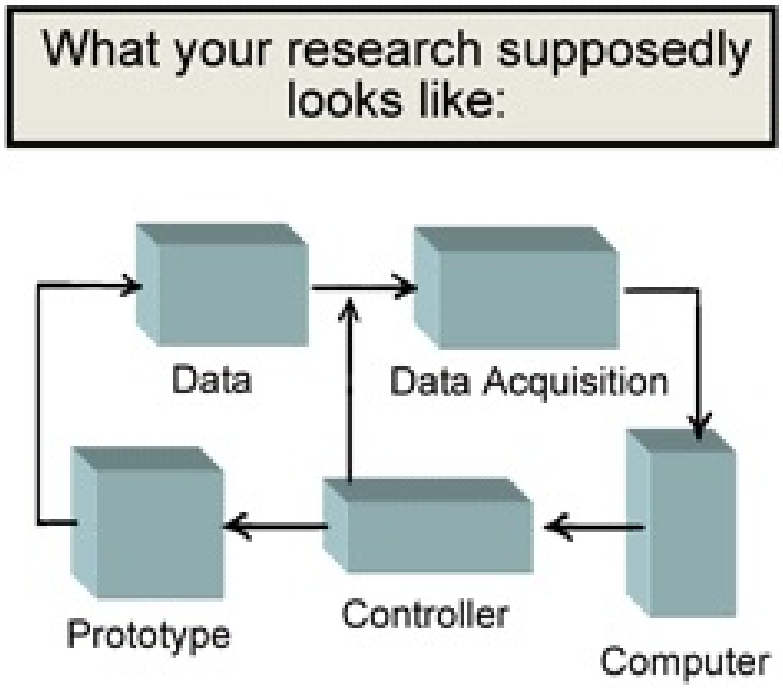



**Figure 1. Experimental Diagram**

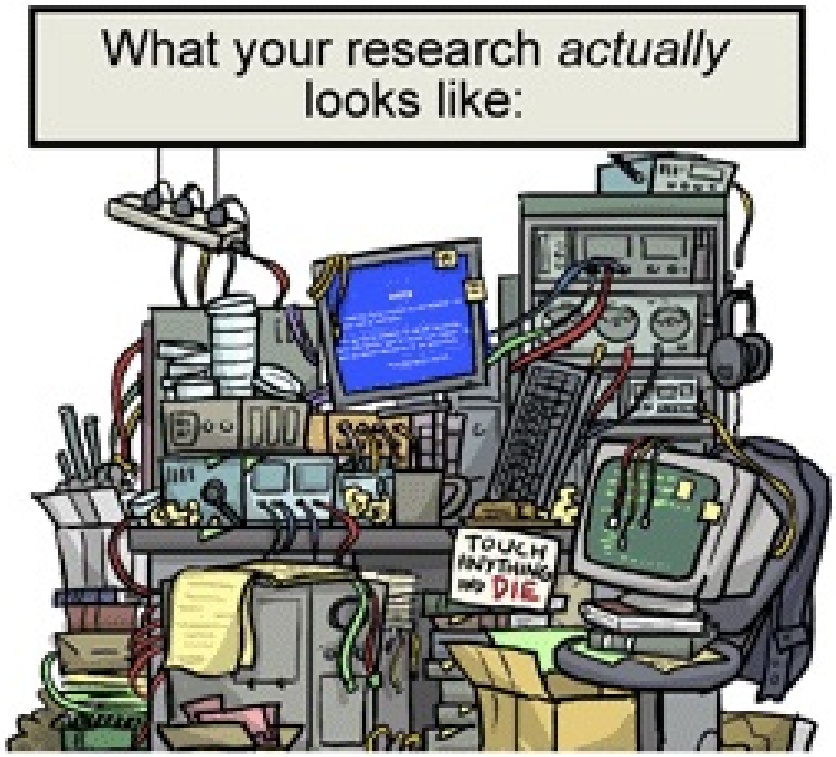



**Figure 2. Experimental Mess**

 [Turabian, 2007]
A manual for writers of research papers, theses, and dissertations. Chicago style for students and researchers; 7th edition.

 [Fraunhofer, 2015] http://simpartix.com
Drying: predicting the deposit pattern of drying particulate suspensions.