

What is Research?

and how to find a topic

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CS 3398
Fall 2013

See Part I of: *A Manual for Writers of Research Papers, Theses, and Dissertations* by Kate L. Turabian, Wayne C. Booth, Gregory G. Colomb and Joseph M. Williams, Univ. of Chicago Press, 7th ed. (Apr 15, 2007).

1

What is Research?

- Asking a question and looking for facts to answer it.

What is a research paper?

- A report about the answer to your question.
- When the answer is not directly found in one source (like a textbook).
- When the reader may not accept your answer without some explanation of how you reached it. (support for your claim).

2

Research Reports

- Must rest on shared facts that readers accept as truths independent of your feelings and beliefs.
- Readers must be able to follow your reasoning from evidence that they accept to the claim you draw from it.
- 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.

3

Research Reports

People will read it without being able to ask you about it

- It's not a presentation or a talk
- It's not a conversation
- It's not even a blog entry

You need to try to anticipate the questions they will have while reading it.

4

“Why do I need to know how to do research?”

- Research happens outside of academia as well as inside of it.
- Practicing "academic" research now will prepare you for other kinds of research.
 - You also learn to use and judge the research of others.
- In every profession researchers must read and evaluate reports before they make a decision.
- Also IRL: don't believe everything you hear.

5

5 goals for your research project

1. Ask a question worth answering
2. Find an answer that you can support with good reasons
3. Find reliable evidence to support your reasons
4. Draft a report that makes a good case for your answer.
5. Revise the draft until readers will think you met the first 4 goals

6

Find a topic

- what do you already know about?
- what do you want to learn about?
- what issues do you debate with others?

Narrow your topic:

- read more about it (wikipedia, textbook)
- forums, blogs, google
- other books (more focused on the topic)
- foundational or summary papers in journals

7

Question your topic

- Ask how and why questions as you read.
- Ask what if? questions
- Analyze the topic:
 - what is its history?
 - what categories are there?
 - how do parts fit together?
- What kinds of questions do other people ask about it?
- Let one question lead to another.

8

Some example questions:

(from software engineering)

- What is the best method to ...
 - perform automated GUI testing?
 - do rapid software development?
 - make programmers productive?
 - test programs with concurrency?
 - prevent bugs in safety critical software?
- Why do they do ... in software engineering?

9

Where to find (reliable) answers

(useful sources)

- Journal articles, technical reports:
 - have been published in an academic journal (in print)
 - DO NOT cite copies of these on the internet.
- Other articles that have been published (in print or e-zine)
- Books (chapters) preferably NOT textbooks!
- On the internet:
 - unpublished reports
 - blog entries
 - web content from a company

10

Evaluating information sources

(is it a good source?)

- To determine if they are appropriate for use in your paper
- <http://help.library.ubc.ca/evaluating-and-citing-sources/evaluating-information-sources/>
- Authority (credentials) Scholarly? peer-reviewed?
- Accuracy, currency, objectivity
- Purpose and audience
- Does it support my thesis/hypothesis/claim?

11

Record the proper bibliographic data

- Author(s)
- Title
- Page numbers, volume + issue + edition numbers
- Publisher: name, place, date
- Conference? name and location and date
- URL **IFF** that's all that you have.

12

How to find the sources:

- Go to Texas State Library home page, under Quick Links:
 - Library catalog (primarily for books)
 - Research Database (for scholarly articles, publications)
 - ◆ (MUST BE LOGGED IN to library to access articles)
 - ◆ Click on computer science
 - ACM Digital Library
 - IEEE Explore
 - ◆ Click on 'G' to find Google Scholar
- Browse the shelves in the library
- Browse internet

13

Example thesis statements

(claims to support)

- Your research question: How do software engineers solve problem X?
- Example 1:
 - There are two methods to solve problem X in software engineering: A and B.
 - A works better in context P.
 - B works better in context Q.
- Example 2:
 - There are several methods to solve problem X in software engineering.
 - The best method is A because reasons 1, 2, and 3.
 - B and C are popular but they do not address issue Q.

14

Example Outlines

(structure of your paper)

- Explain the problem, and briefly explain the methods.
- State the thesis statement.
- Then explain each method in detail.
- Then give pros and cons of each.
- Then a summary paragraph.
- If you only have one solution to the problem you can use this pattern:
 - Explain the problem, and briefly explain the method to solve it.
 - State the thesis: X is a common problem in software engineering. A is a method used to solve it.
 - Explain A in detail.
 - Give the pros and cons of A.
 - Then a summary paragraph.

15