Organising and Writing Research Papers

P Sunthar

Department of Chemical Engineering
Indian Institute of Technology, Bombay
Mumbai 400076, India
P.Sunthar@iitb.ac.in

October 10, 2011
Outline of the Lecture

1. Introduction to Research
2. Questions
3. Answers
4. Writing
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1. Introduction to Research
2. Questions
3. Answers
4. Writing
What is Research?

- What comes to mind?
- Who is a Researcher?
- What is Research?
  - Gather Data
  - Share Data
  - Problem Solving
- Best researchers: Convince why answer is worth knowing.
- A Question and an Answer/Argument

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Structure of a Question

Problem Definition [Booth et al., 2008]

- **Topic:** Name/Area/Title
- **Question:** Who/What/Where/When/Why/How?
- **Practical or Conceptual Significance:** So What? For understanding What?

I am working on the topic of _________ (topic),
because I want to find out _________ (why/what/how),
in order to understand _________ (significance).

I am working on the topic of lipid surfactants, because I want to find out what phenomena lead to a particular size selection when lipids self-assemble from a solution to form vesicles, in order to understand how to control the size of these nano-/micro-capsules for delivering drugs.
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Structure of an Answer/Argument

- Claim or Thesis: What is your answer?
- Reason: Why should I believe that?
- Evidence: How do you know that?
- Acknowledgement and Response: But what about others’ view?
- Warrant: What general principle connects claim to reason?

1. I claim that _________
2. because of _________ (reason/principle),
3. which is based on _________ (material evidence).
4. Though the current view is _________ (ackw.), I show that _________ (response).
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Finding Research Questions

- Start with a Topic, read literature to find out what is unanswered, and worth answering.
- Focussing: Narrowing on a question (not a Topic). Topic can be general or wide.
Questions for Short Research Papers

- Simple physical phenomena around you: Natural and man made.
- Health problems faced by a friend/family member: History, Symptoms, Diagnosis, Cause, Cure, Current Research.
- In a shopping mall:
  - What a particular product is made of?
  - How is it made?
- You came across a technical term (computers, IT, medicine etc.).
- An issue you have debated with others, but did not have sufficient reason or evidence then?
- You have a dream job, what kind of research report might help get it.
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Planning an Answer

- Propose Working Answers/Hypothesis
  - Tentative solutions
  - Write your answers (in detail)
  - What evidence is required to support? (Expts/Theory)
  - Don’t get infatuated by your working hypothesis. It could be wrong!
  - No W. Hypothesis? Consider modifying question.
  - Bounce off answer with working group, supervisor.

- Build a Storyboard
  - Like an outline, but one point per page
  - Ease of addition of data
  - Ease of reorganisation
  - Question and working hypothesis on first page
  - Add alternative answers below (strike out wrong ones)
  - Reason 1,2,3,… in separate pages
  - Evidence 1,2,3,… in separate pages
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Write it down, don’t just Think!

- **Question**
  - Claim/Hypothesis
    1.
    2.
    3.

- **Reason/Guess 1**
  - Evidence/
    Possible Evidence

- **Reason/Guess 2**
  - Evidence/
    Possible Evidence

- **Reason/Guess 3**
  - Evidence/
    Possible Evidence

- **Tentative Answer (Working Hypothesis)**
  - Guess
  - Reason
    - Possible Evidence
    - Evidence
  - Claim
Finding Sources

- **Primary Sources**
  - Journal Publications
  - Reviewed conference proceedings

- **Secondary Sources**
  - Review papers
  - Advances and Serials
  - Research Monographs

- **Tertiary Sources**
  - Wikepedia (for overview and references only)
  - Encyclopedias, Textbooks

- **New to topic? Start from Tertiary.**
Planning an Argument

Recall: Claim, Reason, Evidence

- Write out possible questions/objections from readers (not Guide)
- **Questions *inside* the argument**
  - Evidence: unreliable, inaccurate, insufficient, unrelated
  - Reasons: inconsistent/contradictory, insufficient, weak, irrelavant
- Ask colleagues, friends, guide to object.
Outline of this Section

1. Introduction to Research
2. Questions
3. Answers
4. Writing
   - First Draft
   - Revising
First Draft

- Reorganise storyboard in a logical sequence
  - not necessarily in the order you conceived it
  - not a patchwork of resources
- Sketch a working introduction
- Identify key concepts (words) that
- Order sections by order of reasons
Working Introduction

Write Introduction Twice

- Sketchy, for guiding your writing
- Final, for readers

1. Current Situation
   - What your readers think or know now?
   - Literature review (chief sources)
   - Motivation

2. Research Question
   - Disruptive to current situation. *We know … but …?*
   - What we don’t understand?

3. Significance of Question: *So what if we don’t know?*

4. Answer: Your primary claim.
Write Introduction Twice

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3. Significance of Question: *So what if we don’t know?*

4. Answer: Your primary claim.
Importance of Keywords

- Unites the paper
- Should be repeated in critical sections (Abstract, Introduction, Results, Conclusion)

Using Keywords
- Circle words from claim
- Use same words not variations (alternate meanings)
- Ignore title words
- One term for a concept (reason)
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Ordering Sections

- Sections based on reasons and evidence
- Usually the *Results & Discussion* section
- Sequencing
  - Simple to Complex
  - Logically (step-by-step) dependent
- Sketch an intro to each section. End intro paragraph with the main point (reason).
- Expand the argument (Reason, Evidence, Acknowledgement)
Productive Habits

- Not last moment (for long papers)
- Not marathon
- Schedule few hours per day, with achievable goal
- Suitable environment
  - Turn off mobile
  - Turn off chat windows
  - Don’t check Emails/Social networks
- Don’t wait till you get the full picture. Start writing bits.
- Work on overall draft against refining individual sections
Preliminary Oral Report

Tentative presentation to a group

- After the first draft outline
- Makes ideas coherent
- Test your ideas against “hostile” audience

Present

- Question and Claim
- Reasons supporting it
- Forecast kind of evidence you hope to gather
- Prepare written script for memorising
  - Terse, Timing
  - Introduction
  - Conclusion
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Rewriting Introduction
- Expand *Current Situation* with detailed literature review
- Incremental works, use one or two references as starting point
- Use rejected hypothesis. *It might be expected that . . ., but*
- Revisit keywords usage

Writing Conclusion
- Restate your claim (further expanded)
- Relate briefly to reasons and evidences
- Ensure new keywords are included
- State a new significance or practical application

Write your title last
Revising Sentences

- First few paragraphs key to clearly written report
- First seven or eight words key to well written sentences
- Sentence Tips
  - Subjects and Verbs less than two words apart
  - Action in verbs not nouns (avoid have, do, make, be)
- Read draft aloud
- Proof reading for spelling and punctuation:
  - Read from last sentence to the first