

Scientific and Engineering Projects Class
October 30, 2010

Writing Research Papers for Science Forum

Sources (or Cited Works)

- The information presented in this deck comes from the following sources:
 - Books
 - Gibaldi, Joseph. MLA Handbook for Writers of Research Papers. 6th ed. New York: The Modern Language of America, 2003.
 - Web-Sites
 - Caprette, David R. Experimental Biosciences. Introductory Labs Bio-211. 25 Aug 95. Rice University <<http://www.ruf.rice.edu/~bioslabs/tools/report/reportform.html>>
 - Personal Experience

Key Topics

- What is Research
- Getting Started
- Guidelines
- The Final Product – Your Paper

What is Research?

- Research is:
 - Exploration of a new idea
 - Probing an issue
 - Solving a problem
 - Anything that forces you to go outside of our own personal experience or knowledge
- Research consists of:
 - Original idea
 - Primary research
 - Which is first hand observation and investigation (such as lab experiment or project)
 - Secondary research
 - Which is examination of work done previously by others
- Ultimately, Research is:
 - your own findings, your own results, your own conclusion, your own take on the topic being investigated
- Finally
 - The medium used to present or communicate your research is the **RESEARCH PAPER**

Getting Started

- Assuming you have gone about your research in some methodical way, that means you have
 - Done the research/investigation
 - library, internet, surveys, etc
 - Done the experiment (if applicable)
 - Kept a journal or notes
 - Where you have recorded your method, your observations, your references and your citations
 - **There is NO WAY to write a good research paper without having clearly journalized notes -- GIGO**
- Now you are ready to write your research paper – present/communicate your findings for review or for future use as secondary research

Research Paper Guidelines

- Types of Research Papers:
 - Informative
 - Purpose: to gather and summarize facts in order to inform your reader.
 - Subjects such as economics, science, and business lend themselves to informative papers
 - Analytical
 - Purpose: to draw general conclusions from facts and basic evidence.
 - You must analyze information -- record the facts, comment on them, and come to conclusions about meaning, causes, consequences, and relationships.
 - Persuasive/Argumentative
 - Purpose is to arrive at judgments about your topic based upon research findings.
 - You examine both sides of a controversial topic and then express and support a reasoned judgment
- Your Research Paper for the Science Forum will be either informative or analytical or a combination of both

Guidelines and Expectation

- Your Research Paper for the Science Forum **must** have the following:
 - Cover or Title Page
 - Abstract
 - Introduction
 - Materials and Methods
 - Discussion
 - Results
 - Citations
 - Appendices
- This is one format for scientific papers

Cover or Title Page

- Include:
 - Science Forum Project Name
 - Your Name
 - Date
 - May contain the abstract for smaller projects

Abstract

- The Abstract is a concise summary of your project.
- It should provide the reader with enough information to know
 - What the research project is all about
 - Why you are doing this research
 - A good reason is NOT because it's a science forum project.
 - A good reason is your hypothesis, or the question you are trying to answer
 - How you approached the problem
 - Brief description of your experiment or approach
 - Results summary
 - Conclusion
 - **NOTE:** The reader in this case might be another researcher searching abstracts as possible sources for their own work -- "Secondary Research"
- It should be no more than 1 well written paragraph
 - Written in the past tense (because it is summarizing work that has already been done)
- It is recommended that the Abstract be written after the rest of the paper is written. **Can you tell me why?**

Introduction

- This is the *meat* of your paper
- This section should have multiple paragraphs, each paragraph providing in **detail** (much more than what was provided in the Abstract)
 - What
 - Include Project Requirements (if Engineering-type project)
 - Why
 - How
- Don't worry if it is somewhat repetitive with your Abstract.
 - Think of the Abstract as a "teaser" that got the reader interested in reading your paper.

Materials and Methods

- Materials (if applicable)
 - Describe the Materials used in your experiment (or project)
- Methods
 - Describe the methodology used completely
 - That is describe your experiment
 - If engineering type of project, describe your test plan

Results

- Describe in words your findings
- Present and or illustrate your findings
 - Tables, graphs, figures
- Do not interpret your findings in this section

Discussion

- Describe all of your findings and observations
- Interpret your results
 - Was your hypothesis supported, rejected, or you cannot make a decision with confidence
 - If your results are different from your expectation, explain what you think happened
 - If your results agree, then describe the evidence that supports it
- Recommend future studies
 - What other questions remain that your project did not address

Citations

- Why do we cite our sources?
 - To Avoid plagiarism
 - *Definition – plagiarism is the act of stealing and passing off the ideas or words of another as your own*
 - To acknowledge or give credit where credit is due
 - To provide further references to those reading your paper
 - Avoid plagiarism -- List all references
 - Take care to follow appropriate citation standard
 - If you do not have the MLA book or other book on the citation standards --Check out this website for examples using the MLA standard.
http://myrin.ursinus.edu/help/resrch_guides/cit_style_mla.htm#index
 - You can never have too many citations
 - This is another good reason why you keep a project journal, to keep track of all your sources/references
 - If you have no references say “No references were consulted”
- **For your science forum project it would be a good idea to consult at least 2 references.**

Appendices

- Use this section to include:
 - Further test details
 - Trials/attempts
 - Example: if your result is the average of multiple trials, then use this section to show all the data collected from your trials
 - Calculations/computations
- Create a separate section heading for each appendix.
 - Appendix 1: Test Trial Details
 - Appendix 2: Computations
 - Etc.

The Final Product -- Your Paper

- Use MS word to create your paper
- 12 point (readable) font (eg., Times New Roman, Arial, Georgia, Veranda)
- Each section of the paper MUST have the appropriate heading --Select a consistent MS word heading style (Numbered or un-numbered; the choice is yours)
- 1 inch margins all around (sides, top, bottom)
- Spell check
- Grammar check
- Number/label all figures
- Number all pages
- Create a header for each page with:
 - The name of your project in upper left hand side
- Create a footer for each page with:
 - Your name on the bottom left
 - Page number on bottom right
- Use appropriate scientific notation