



GUIDELINES FOR PROJECT RESEARCH PAPERS

One project research paper may be submitted within a single semester, or extended beyond one semester and submitted at the end of the school year – depending on the duration of your research project.

- If submitted within a single semester, sections one and two must be submitted at the end of the first quarter, while sections three and four will be added to your paper during the second quarter of the semester
- If submitted at the end of the school year, section one must be submitted at the end of first quarter, section two added and submitted at the end of second quarter, section three added and submitted at the end of third quarter, and section four added and submitted at the end of fourth quarter.

The paper must be accompanied by an end of semester/year research project presentation. Research papers are graded on the quality of the background sources used, organization of the information, grammar and proper formatting, complete and precise adherence to the “scientific method” in conducting and reporting on the project’s experiments, and the student’s comprehension and logical discussion of the data, analysis, and conclusions.

What is involved in producing a good project research paper?

A project research paper is a written report describing your original research and results on an experimental project in science. A research project begins as a question and involves actual experimentation to gather data that will help answer the question. A research project is an investigation in which a hypothesis is formed, experiments are designed and conducted, data are recorded, and conclusions are drawn.

Sources: The paper must provide vital information from at least 5 quality scientific sources (internet, books, journals, scientific papers, etc...) to provide background information on the project and its experiments, including: history of the scientific concepts involved, current developments in the field, and vital information about organisms and/or tools used in the project; as well as the proper design and set up of the project’s experiments.

Formatting: The body of the paper must be no less than 2,500 words in length – (does not include *Works Cited* section). The paper must be double-spaced, use “only” 12pt Times New Romans or Arial font, with 1½ inch margins all around. Title, headings, and sub-headings, must be centered but not bold, underlined, or italicized. Do not place extra spaces between paragraphs. *Works Cited* section must be listed on its own page and properly formatted. Place your name and the submission date in the upper left-hand corner of the first page. All consecutive pages must be numbered in the upper right hand corner. Correctly spell and use scientific terms and names of organisms.

SECTION ONE - Proposal:

Note: Always write scientifically (in 3rd person) and in paragraph form with complete sentences (a numbered or bulleted list is **not** acceptable). In this section you must:

- State your research question(s) or the problem you are investigating.
- State your hypothesis (prediction of the findings)
- Explain your purpose in investigating the question(s) or problem, and why it is significant, especially the global importance of the matter.
- Provide background information on the nature and scope of your project, including: history of the scientific concepts involved, current developments in the field, and vital information about organisms, mechanical systems, or tools used in the project; as well as the proper design and set up of the project's experiments – (remember, you must use five reliable and well documented sources). Use illustrations, charts, graphs, pictures from related sources to help support the major points.
- Provide input from a least one “mentor” whom you consider to be an expert in the field you intend to investigate. This input may come from personal interviews, phone conversations, email, or other personal online communication. Tell why you think this person has some expertise and what your mentor thinks about your project; provide any advice or direction they have given you.
- Define important scientific terms and concepts, and provide the scientific names and descriptions of all organisms and tools that will be used in your project. This will help demonstrate evidence of your own personal understanding of the scientific and technical principles involved in your project.
- Briefly review the materials and items you will need to run your project and to successfully complete your experiments. Provide expense estimates to show how much you expect your project to cost.
- Provide a “timeline” for running your project and conducting your experiments. Make your timeline as accurate, full, and complete as possible.

SECTION TWO – Design and Methods:

Remember: Always write scientifically (in 3rd person) and in paragraph form with complete sentences (a numbered list of steps is **not** acceptable). Even though your project may be continuing, always write in the past tense – as though it were completed. Think of your experimental design as a recipe: you are explaining to the reader, step-by-step, how to set up the experiment(s) and follow the recipe so that the experiment(s) can be precisely replicated by others anywhere and anytime. In this section you must:

- Explain how each experiment is set up and designed to work.
- Identify the important experimental variables and controls.
- Name and describe items, equipment, and/or mechanical systems used.
- Describe your procedures and processes; how the experiment was conducted; your actions step-by-step – be very specific!
- Describe the kind of data produced by the experiment and how that data was collected, recorded, and reported.

SECTION THREE – Results:

Present the project data generated by your experiment(s). Collect examples of the data you have taken. Present the findings of the research in logical order. If relevant, report the data from various stages (beginning, middle, end) of the experiment. Provide both written and visual explanation of the results, but do not interpret the results in this section; just present the facts. Report all findings, even if inconclusive or trivial. Use illustrations to visually represent the results. Include data tables, as well as charts, graphs, photos, or other forms of data reports. Pick graph types carefully and logically so that they truly provide the best picture of the data. Be very thorough, be very neat, and be sure to include all appropriate labeling on your tables/charts/graphs, etc...

- **Figures** are labeled beneath. Charts, graphs, maps and photographs are considered “**figures**” and are numbered consecutively. Use Fig. 1, Fig. 2, Fig. 3 etc. Captions are written descriptions of figures and are placed under each figure.
- **Tables** are labeled differently from figures. They are numbered consecutively, as Table 1, Table 2, Table 3, etc., however, each table is given a title which is placed above the table. Data tables are labeled at the top.

NOTE: The results of any statistical analyses performed should also be reported in this section. For example, be sure to report: percentages of growth or decline, number/percentage comparisons between test groups, etc... Remember to explain the statistical tests used and how you arrived at your results.

SECTION FOUR – Discussion:

Analysis: Interpret and explain the meaning of the data; refer to all tables and graphs used in section three. What does the data show has happened in your experiment, and how does the data reveal this?

Conclusions:

- Restate and *review* research questions and/or problem statement and hypothesis. Relate the data results to your original hypothesis – was the hypothesis proven true, false, or inconclusive?
- Compare findings with existing research; describe whether patterns agree or disagree.
- Finish by summarizing the most important points of the investigation. Was your research question(s) answered, or problem statement sufficiently addressed?
- Describe data errors or unforeseen problems in carrying out the experiment or survey. This section may serve as a warning to other researchers designing similar experiments.
- Suggest improvements for future research designs or further experiments to continue this project.

Abstract (to be placed at the *very beginning of your paper* – before section one):

Now that you have completed your experiment(s) and written your paper, provide a brief overview of the project in one or two paragraphs – (250 to 500 words).

- Describe the nature of your project and why you chose to investigate this research question or problem statement.
- Include some pertinent background information and describe some information learned from past research done by others.
- Describe how the problem was studied (*explain your methods*).
- Briefly state what was found (*summarize your results*).
- Quickly analyze the meaning of the results (*discussion and conclusions*).

The abstract should be written after all other sections of your Project Research Paper have been written. Do not include subheadings, illustrations, or bibliographic references. Do not emphasize minor details or include any information or conclusions not stated in the paper. Do not use first person.

Works Cited (must be on a separate page at the end of your paper):

- Categorize – internet sources, books, journals/magazines, illustrations.
- Alphabetize – all sources within each category.
- Format – in accordance with MLA formatting (See STARS Website – Tools).