

Writing the Scientific Research Proposal

When scientists request financial support for their work from government agencies or private foundations, they submit grant applications in a standard format. The scientist must thoroughly and accurately describe the reason, goals, and design of the proposed research. The reviewers at the granting agency will critically evaluate the quality of the experimental design, the potential value of the research, and its likelihood of success. The proposal has four standard parts, in the following order:

Background and Significance

This section describes what is already known about the problem, including previous investigators' results and current theories. Describe what you already know, and what questions need to be answered to further our understanding. By identifying what needs to be answered, and why, we establish the relevance, significance, and value of doing the research.

- What do we already know? What have others seen? What is generally believed?
- What questions remain unanswered? What don't we know, but need to?
- What potential value will this research have, both to science and to society?

Specific Aims

This section is where the scientist clearly and concisely identifies what she plans to accomplish. The scientist identifies the hypotheses she plans to test and questions she intends to answer. Note that although the aim is stated as a goal ("I plan to test whether..." or "I will determine how..."), if possible a testable hypothesis should be stated clearly ("plants grow slower in bright light than in dim light"). A hypothesis is an educated guess of how things will turn out, based on knowledge of the field as described in the Background and Significance section. The way in which the hypothesis is stated should directly relate to how the experiment is designed and how data will be collected and analyzed.

- What questions will I answer? What hypotheses will I test? What will I find out?

Experimental Plan

This section has the scientist's detailed description of how the experiments will be conducted to directly test the hypothesis, how data will be collected, and how measurements will be made. It also describes how the scientist plans to analyze or evaluate her data, and how she will judge whether her results support or disprove her hypothesis.

- How will I do the experiments? What controls will I use? What will I

measure or observe?

- How will I evaluate or compare my data? What criteria will I use to judge whether my observations support my hypothesis?

Literature Cited

The scientist lists in bibliography format what information sources were used to develop her proposal. Important journal articles and review papers are listed. Citations should be placed throughout the proposal narrative where information is specifically drawn from these works. Both the in-text citations and the bibliography should adhere to a format common to scientific publications. The Modern Language Association (MLA) format is not used in scientific writing.

Critiquing the Scientific Research Proposal

Background and Significance _____/30 pts.

1. + + + 0 Did the author thoroughly describe what is already known about this subject, and all of the **background information** needed to understand the proposed research? What themes or topics were missing?
2. + + + 0 Did the author thoroughly describe what remains unknown about this subject, and identify the **experimental question** to be addressed in the proposed research? What themes or topics were missing?
3. + + + 0 Did the author describe what **value and potential benefit** the proposed research will have, and why the experimental question is interesting, important, and relevant? What themes or topics were missing?
4. 0 - - - Were there **inaccurate or false statements**? What were they?
5. 0 - - - Was there any **unnecessary or irrelevant material** presented, excessive or meaningless verbiage, or material that is obvious to the intended audience? What were they?

Specific Aims _____/20 pts.

6. + + + 0 Did the author clearly and specifically state the **overall objective and expected outcomes** of the research?
7. + + + 0 Did the author clearly state the **individual tasks and specific aims** to be pursued? Would accomplishing these specific aims lead to achieving the overall objective and answering the experimental question? What aims were missing?
8. 0 - - - Were there **inaccurate or false statements**? What were they?
9. 0 - - - Were there **excess, or vaguely worded aims**? What were they?

Experimental Plan _____/30 pts.

10. + + + 0 Did the author thoroughly describe the **experiments to be performed**? What experiments or details were missing?
11. + + + 0 Did the author describe **how each experiment contributes to the aims** of the project? Are the experiments appropriate? What was missing?
12. 0 - - - Were there **inaccurate or false statements**? What were they?
13. 0 - - - Was there any **unnecessary or irrelevant material** presented, or material that is obvious to the intended audience? What were they?

Literature Cited: Citations and Bibliography _____/10 pts.

14. 0 - - - Was material from other sources given appropriate **attribution**?
15. 0 - - - Did the author write in her own words, and **avoid excess quotations**?
16. 0 - - - Did the **format used for in-text citations and the bibliography** conform to standards for scientific literature?

Grammar, Spelling, and Punctuation -1 point/error = -____ pts.

17. - ___ pts Were there **spelling errors**?
18. - ___ pts Were there **punctuation errors**?
19. - ___ pts Were there **grammatical errors** in verb form, noun-verb agreement, or sentence structure?
20. - ___ pts Were all **abbreviations** defined?
21. - ___ pts Were **scientific terms** used accurately, and defined where necessary?

Overall Organization and Quality of Writing _____/10 pts.

22. 0 - - - Did the **section headings** conform to the format for a scientific proposal?
23. + + + 0 Was information **organized within the appropriate sections**, and presented in an **logical, clear manner**? Was the paper “well written”?