Review Essays for the Biological sciences

A review paper for the biological sciences serves to discuss and synthesize key findings on a particular subject. Review papers are helpful to the writer and their colleagues in gaining critical awareness in specialized fields that may or may not be their own.

This guide explains what a review paper is and identifies several approaches to writing a review paper. Although much of the information is geared directly to the biological sciences, it is generally applicable to review papers in all fields.

What is a Review Paper?

A review paper is a synthesis of primary sources (mainly research papers presented in academic journals) on a given topic. A biological review paper demonstrates that the writer has thorough understanding of the literature and can formulate a useful analysis. While no new research is presented by the writer, the field benefits from the review by recieving a new perspective. There are several approaches one may take when writing a biological review:

A State of the art review

A state of the art review considers mainly the most current research in a given area. The review may offer new perspectives on an issue or point out an area in need of further research.

A Historical review

A historical review is a survey of the development of a particular field of study. It may examine the early stages of the field, key findings to present, key theoretical models and their evolution, etc.

A Comparison of perspectives review
A comparison of perspectives review contrasts various ways of looking at a certain topic. If in fact there is a debate over some process or idea, a comparison of perspectives review may illustrate the research that supports both sides. A comparison of perspectives review may introduce a new perspective by way of comparing it to another.

**A Synthesis of two fields review**

Many times researchers in different fields may be working on similar problems. A synthesis of two fields review provides insights into a given topic based on a review of the literature from two or more disciplines.

**A Theoretical model building review**

A theoretical model building review examines the literature within a given area with the intention of developing new theoretical assumptions.

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**Key considerations for writing a biological review paper**

This guide will inform you of certain things not to miss when writing a review paper. It will also give you some information about using and documenting your sources.

**Keep your focus narrow.**

When writing a review paper it is important to keep the scope of the topic narrow enough so that you can discuss it thoroughly. For example a topic such as *air quality in factories* could be narrowed significantly to something like *carbon dioxide levels in auto manufacturing plants*.

A good way to narrow your focus is to start with a broad topic that is of some interest to you, then read some of the literature in the field. Look for a thread of the discussion that points to a more specific topic.

**Analyze, synthesize, and interpret.**

A review paper is not a pure summary of the information you read for your review. You are required to analyze, synthesize, and interpret the information you read in some meaningful way.

It is not enough to simply present the material you have found, you must go beyond that and explain its relevance and significance to the topic at hand.

Establish a clear thesis from the onset of your writing and examine which pieces of your reading help you in developing and supporting the ideas in your thesis.

**Use only academic sources.**
A review paper reviews the academic body of literature—articles and research presented in academic journals. Lay periodicals such as, Discover, Scientific America, or Popular Science, are not adequate sources for an academic review paper.

If you are having trouble finding the academic journals in your field, ask one of your professors or a reference librarian.

**Document your sources.**

The material that you discuss in a review paper is obviously not your own, therefore it is crucial to document your sources properly. Proper documentation is crucial for two reasons: 1. It prevents the writer from being accused of plagiarism and 2. It gives the reader the opportunity to locate the sources the writer has reviewed because they may find them valuable in their own academic pursuits. Proper documentation depends on which style guide you are following.

**Quote sparingly and properly.**

No one wants to read a paper that is simply a string of quotes; reserve direct quotations for when you want to create a big impact. Often times the way a quote is written will not fit with the language or the style of your paper so paraphrase the authors words carefully and verbage as necessary to create a well formed paragraph.

**Choose an informative title.**

The title you choose for your review paper should give some indication of what lies ahead for the reader. You might consider the process you took in narrowing your topic to help you with your title—think of the title as something specific rather than a vague representation of your paper's topic. For example the title Wastewater Treatment might be more informative if rewritten as The Removal of Cloroform Bacteria as Practiced by California's Municipal Water Treatment Facilities.

**Consider your audience.**

More than likely your audience will be your academic peers, therefore you can make a couple assumptions and choose a writing style that suits the audience. Though your audience may lack the detailed knowledge you have about your topic, they do have similar background knowledge to you. You can assume that you audience understands much of the technical language you have to use to write about your topic and you do not have to go into great detail about background information.

**Elements of a review paper**

This guide explains each section of a review paper and gives specific information about what should be included in each.

**Title Page**
On the title page include the title, your name, and the date. Your instructor may have additional requirements (such as the course number, etc.) so be sure to follow the guidelines on the assignment sheet. Professional journals may also have more specific requirements for the title page.

Abstract

An abstract is a brief summary of your review. The abstract should include only the main points of your review. Think of the abstract as a chance for the reader to preview your paper and decide if they want to read on for the details.

Introduction

The introduction of your review should accomplish three things:

- **Introduce your topic**
  - It may sound redundant to "introduce" your topic in the introduction, but often times writer's fail to do so. Let the reader in on background information specific to the topic, define terms that may be unfamiliar to them, explain the scope of the discussion, and your purpose for writing the review.
- **State your topic's relevance**
  - Think of your review paper as a statement in the larger conversation of your academic community. Your review is your way of entering into that conversation and it is important to briefly address why your review is relevant to the discussion. You may feel the relevance is obvious because you are so familiar with the topic, but your readers have not yet established that familiarity.
- **Reveal your thesis to the reader**
  - The thesis is the main idea that you want to get across to your reader. your thesis should be a clear statement of what you intend to prove or illustrate by your review. By revealing your thesis in the introduction the reader knows what to expect in the rest of the paper.

Discussion

The discussion section is the body of your paper. The discussion section contains information that develops and supports your thesis. While there is no particular form that a discussion section must take there are several considerations that a writer must follow when building a discussion.

- **Don't summarize!**
  - A review paper is not simply a summary of literature you have reviewed. Be careful not to leave out your own analysis of the ideas presented in the literature. Synthesize the material from all the works—what are the connections you see, or the connections you are trying to illustrate, among your readings.
- **Analyze, Synthesize, Interpret.**
  - A review paper is not a pure summary of the information you read for your review. You are required to analyze, synthesize, and interpret the information you read in some meaningful way. It is not enough to simply present the material you have found, you must go beyond that and explain its relevance and significance to the topic at hand.
Establish a clear thesis from the onset of your writing and examine which pieces of your reading help you in developing and supporting the ideas in your thesis.

- **Stay focused.**
  - Keep your discussion focused on your topic and more importantly your thesis. Don't let tangents or extraneous material get in the way of a concise, coherent discussion. A well focused paper is crucial in getting your message across to your reader.

- **Organize your points.**
  - Keeping your points organized makes it easier for the reader to follow along and make sense of your review. Start each paragraph with a topic sentence that relates back to your thesis. The headings used for this guide give you some idea of how to organize the overall paper, but as far as the discussion section goes use meaningful subheadings that relate to your content to organize your points.

- **Relate the discussion to your thesis.**
  - Your thesis should illustrate your objectives in writing the review and your discussion should serve to accomplish your objectives. Make sure your keep your discussion related to the thesis in order to meet your objectives. If you find that your discussion does not relate so much to your thesis, don't panic, you might want to revise your thesis instead of reworking the discussion.

**Conclusions**

Because the conclusions section often gets left for last it is often the weakest part of a student review paper. It is as crucial a part of the paper as any and should be treated as such.

A good conclusion should illustrate the key connections between your major points and your thesis as well as they key connections between your thesis and the broader discussion—what is the significance of your paper in a larger context? Make some conclusions—where have you arrived as a result of writing this paper?

Be careful not to present any new information in the conclusion section.

**References**

Here you report all the works you have cited in your paper. The format for a references page varies by discipline as does how you should cite your references within the paper.

**Citation Information**


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