Ten Steps to Writing an Effective Abstract

San Francisco Edit

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An abstract is a condensed version of the manuscript, which highlights the major points covered, concisely describes its content and scope, and reviews its material in abbreviated form. It is usually the first section read and sets the tone of the paper for the reviewer. It must be concise and easy to read and must cover the important points of the paper.

Many publications have a required style for abstracts; the "Guidelines for Authors" provided by thepublisher will provide specific instructions. Stay within the publisher's guidelines, or your manuscript might be rejected.

Writing an abstract involves summarizing a whole manuscript and providing as much new information as possible. The best way to write an effective abstract is to start with a draft of the complete manuscript and follow these 10 steps:

1. Identify the major objectives and conclusions.
2. Identify phrases with keywords in the methods section.
3. Identify the major results from the discussion or results section.
4. Assemble the above information into a single paragraph.
5. State your hypothesis or method used in the first sentence.
6. Omit background information, literature review, and detailed description of methods.
7. Remove extra words and phrases.
8. Revise the paragraph so that the abstract conveys only the essential information.
9. Check to see if it meets the guidelines of the targeted journal.
10. Give the abstract to a colleague (preferably one who is not familiar with your work) and ask him/her whether it makes sense.

Writing an effective abstract will improve the chances of your manuscript being accepted, encourage people to read it, and increase its impact.

A number of studies have indicated that a badly written manuscript with poor use of English, even with good science, has less chance of being accepted and published.

For more detailed information regarding writing a manuscript for publication, please review some of our other articles at http://www.sfedit.net/newsletters.htm. These articles approach such subjects as Writing the First Draft, Writing Effective Results, Methods and Materials, Discussions, Selecting a Journal, Responding to Reviewers, etc.

Ten Steps to Writing an Effective Introduction

The purpose of the Introduction is to stimulate the reader's interest and to provide pertinent background information necessary to understand the rest of the paper. You must summarize the problem to be addressed, give background on the subject, discuss previous research on the topic, and explain *exactly* what the paper will address, why, and how. Besides motivating a reader to read your manuscript and to care about your results, the Introduction is useful also to the journal's reviewers and editors in judging the importance of your manuscript.

An Introduction is usually 300 to 500 words, but may be more, depending on the journal and the topic. Therefore, the Introduction needs to be very concise, well structured, and inclusive of all the information needed to follow the development of your findings.

Some people recommend that the Introduction be the first section written when writing a manuscript. If you need help beginning, please read our article *Twelve Steps in Developing an Effective First Draft* at https://www.sfedit.net/newsletters.

Below are the steps in developing an effective Introduction. However, since every journal is different, it is important that you look at papers in your targeted journal to determine whether they use all of these steps. For example, some journals do not include conclusions in the Introduction.

1. Begin the Introduction by providing a concise *background* account of the problem studied.

2. State the *objective* of the investigation. Your research objective is the most important part of the introduction.

3. Establish the *significance* of your work: Why was there a need to conduct the study?

4. Introduce the reader to the pertinent *literature*. Do not give a full history of the topic. Only quote previous work having direct bearing on the present problem.

5. Clearly state your *hypothesis*, the variables investigated, and concisely summarize the methods used.

6. *Define* any abbreviations or specialized terms.

7. Provide a concise *discussion* of the results and findings of other studies so the reader understands the big picture.

8. Describe some of the major *findings* presented in your manuscript and explain how they contribute to the larger field of research.

9. State the principal *conclusions* derived from your results.

10. Identify any *questions* left unanswered and any new questions generated by your study.

Other points to consider when writing your Introduction:

1. Be aware of who will be reading your manuscript and make sure the Introduction is directed to that audience.

2. Move from general to specific : from the problem in the real world to the literature to your research.

3. Write in the present tense except for what you did or found, which should be in the past tense.

4. Be concise.

Twelve Steps to Writing an Effective Materials and Methods

In the Materials and Methods section you explain clearly how you conducted your study in order to: (1) enable readers to evaluate the work performed and (2) permit others to replicate your study.

You must describe exactly what you did: what and how experiments were run, what, how much, how often, where, when, and why equipment and materials were used. The main consideration is to ensure that enough detail is provided to verify your findings and to enable the replication of the study.

You should maintain a balance between brevity (you cannot describe every technical issue) and completeness (you need to give adequate detail so that readers know what happened).

This should be the easiest section to write. If you need help beginning, please read our article Twelve Steps in Developing an Effective First Draft at https://sfedit.net/newsletters/.

Since each journal has different requirements, review the journal's guidelines before beginning to write this section. The steps listed here are a general compilation of these requirements.

1. Order your procedures chronologically or by type of procedure and then chronologically within type of procedure using sub-headings, where appropriate, to clarify what you did. It is up to you to decide what order of presentation will make the most sense to your reader.

2. Use the past tense and the third person to describe what you did. For example: "The sample was incubated at 37ºC for 3 days." - NOT : "I incubate the sample at 37ºC for 3 days."

3. Describe your experimental design clearly, including the hypotheses you tested, variables measured, how many replicates you had, controls, treatments, etc.

4. Explain why each procedure was done. Reference may be made to a published paper as an alternative to describing a lengthy procedure.

5. Identify the source of any specific type of equipment, a specific enzyme, organism, or a culture from a particular supplier, which is critical to the success of the experiment.

6. Describe in detail any modifications to equipment or equipment constructed specifically for the study and, if pertinent, provide illustrations of the modifications.

7. Precisely quantify measurements (all metric) and include errors of measurement.

8. Describe the dates and the site where your field study was conducted including physical and biological characteristics of the site, if pertinent to the study's objectives.

9. Identify treatments using the variable or treatment name, rather than an ambiguous, generic name or number (e.g., use "healthy donors" rather than "group 1").

10. If required by the journal, mention the approval for the study by the relevant ethics committee(s) and the informed consent of the subjects.

11. Describe statistical tests and the comparisons made ; ordinary statistical methods should be used without comment ; advanced or unusual methods may require a literature citation.

12. Show your Materials and Methods section to a colleague and ask whether they would have difficulty in repeating your study.

Other points to consider when writing the Materials and Methods :

1. Don't mix results with procedures.

2. Omit all explanatory information and background - save it for the discussion.

3. Don’t include information that is irrelevant to the reader, such as what color ice bucket you used, or which individual logged in the data.

Fourteen Steps to Writing an Effective Discussion Section

The purpose of the Discussion is to state your interpretations and opinions, explain the implications of your findings, and make suggestions for future research. Its main function is to answer the questions posed in the Introduction, explain how the results support the answers and, how the answers fit in with existing knowledge on the topic. The Discussion is considered the heart of the paper and usually requires several writing attempts.

The organization of the Discussion is important. Before beginning you should try to develop an outline to organize your thoughts in a logical form. You can use a cluster map, an issue tree, numbering, or some other organizational structure. The steps listed below are intended to help you organize your thoughts. If you need additional help see our articles *Eight Steps to Developing an Effective Manuscript Outline* and *Twelve Steps to Developing an Effective First Draft of your Manuscript* at https://www.sfedit.net/newsletters/.

To make your message clear, the discussion should be kept as short as possible while clearly and fully stating, supporting, explaining, and defending your answers and discussing other important and directly relevant issues. Care must be taken to provide a commentary and not a reiteration of the results. Side issues should not be included, as these tend to obscure the message. No paper is perfect ; the key is to help the reader determine what can be positively learned and what is more speculative.

1. Organize the Discussion from the specific to the general : your findings to the literature, to theory, to practice.

2. Use the same key terms, the same verb tense (present tense), and the same point of view that you used when posing the questions in the Introduction.

3. Begin by re-stating the hypothesis you were testing and answering the questions posed in the introduction.

4. Support the answers with the results. Explain how your results relate to expectations and to the literature, clearly stating why they are acceptable and how they are consistent or fit in with previously published knowledge on the topic.

5. Address all the results relating to the questions, regardless of whether or not the findings were statistically significant.

6. Describe the patterns, principles, and relationships shown by each major finding/result and put them in

perspective. The sequencing of providing this information is important ; first state the answer, then the relevant results, then cite the work of others. If necessary, point the reader to a figure or table to enhance the "story".

7. Defend your answers, if necessary, by explaining both why your answer is satisfactory and why others are not. Only by giving both sides to the argument can you make your explanation convincing.

8. Discuss and evaluate conflicting explanations of the results. This is the sign of a good discussion.

9. Discuss any unexpected findings. When discussing an unexpected finding, begin the paragraph with the finding and then describe it.

10. Identify potential limitations and weaknesses and comment on the relative importance of these to your interpretation of the results and how they may affect the validity of the findings. When identifying limitations and weaknesses, avoid using an apologetic tone.

11. Summarize concisely the principal implications of the findings, regardless of statistical significance.

12. Provide recommendations (no more than two) for further research. Do not offer suggestions which could have been easily addressed within the study, as this shows there has been inadequate examination and interpretation of the data.

13. Explain how the results and conclusions of this study are important and how they influence our knowledge or understanding of the problem being examined.

14. In your writing of the Discussion, discuss everything, but be concise, brief, and specific.

Responding to Reviewers

After submitting your manuscript, you will receive a letter from the journal's editor containing comments from the different reviewers, whose identities are normally kept confidential. The letter will either reject or provisionally accept your manuscript.

If the editor has rejected your manuscript, there will usually be reasons given for the decision. If that is the case, you need to assess the reviewers' comments to determine whether your manuscript might be accepted if you made certain revisions. In the majority of cases, the editor and reviewers will be trying to help you produce a high quality manuscript.

Do not take the reviewers' comments personally. In some instances it might be bad timing. The journal might have just accepted or published a similar study. You can always submit your manuscript to another journal. If you do, it is usually best to take the reviewers' comments into consideration. Even if you feel that the reviewers have misunderstood something in your paper, others might do the same. If the editor believes that the subject of your paper falls outside the scope of the journal, there is no point in challenging this. You have no choice but to submit your manuscript to another journal.

If your manuscript has been provisionally accepted, you now need to plan a strategy for revising your paper and gaining full acceptance. This will include resubmitting a revised manuscript and responses to the reviewers' comments.

The following will assist you in responding to the reviewers' comments and resubmitting your manuscript :

1. Read all of the comments from reviewers and the editor.

2. Never respond immediately. Allow yourself a few days to reflect on the comments.

3. If the comments from the editor and reviewers can be used to improve your manuscript, by all means, make those changes.

4. If your manuscript was rejected and you still feel that your work deserves publication, send it quickly to another journal. Some data can become less relevant if too much time passes.

5. If your manuscript has been provisionally accepted, it is a good idea to respond promptly. As soon as possible, begin drafting a polite, thoughtful, clear, and detailed response.

6. Be polite. Avoid a defensive or confrontational tone in your response. The goal is to extract helpful information from the comments, adopt any useful suggestions to improve your manuscript, and calmly explain your point of view when you disagree.

7. Respond completely to each comment in an orderly, itemized manner, and, if necessary, copy and paste into the letter any substantive changes made to the manuscript. There is no limit on the length of your response. Most editors are willing to read a long and complete response.

8. Change and modify your manuscript where it makes sense. You are not required to make every suggested change, but you do need to address all of the comments. If you reject a suggestion, the editor will want a good reason with evidence supported by references. Just because you prefer it your way is not a good enough reason.

9. Reviewers do not always agree with each other, in which case you must make a choice. Decide which recommendations seem more valid and note in your response letter to the editor that you received conflicting advice and made what you think is the best choice.

10. If the reviewer is obviously wrong and has made a mistake, you are entitled to provide an argument and provide facts that can be referenced.

11. Sometimes you are asked to reduce considerably the length of the manuscript. You must not feel too attached to your words and should shorten the manuscript.

12. Ensure that what you say you have done to the manuscript, has in fact been done, and do make sure you follow the journal's guidelines. Editors become irritated when they find that comments made in the response letter do not match what is in the manuscript.

The process of getting a paper published in a scientific peer-reviewed journal is a challenging but rewarding one, once all your hard work finally pays off and the reprints arrive.

Journal Submission Checklist

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It is important to prepare your manuscript properly, part of which is to follow the journal's guidelines. Using a checklist helps to ensure acceptance of your manuscript by the journal.

Almost all journals have their guidelines on their website as well as publish their guidelines quarterly or in every issue. Guidelines are subject to change, so be sure you have the most recent guidelines. Below is a general checklist to assist you in ensuring your manuscript meets all the journal's requirements. Every journal is different and not all journals will require all of the items listed. Depending upon the journal you are targeting, you might want to add specific items to this list.

Cover letter

❑ Determine whether a cover letter is needed

❑ Address the correct editor according to the manuscript subject

❑ Use the correct address

❑ Review what is required in the cover letter

General

❑ Determine the article type you are submitting

❑ Use the correct font type and size

❑ Adjust the line spacing (single or double spacing)

❑ Check the format for section headings

❑ Put the sections in the correct order

❑ Check the word length limits

❑ Use line numbering, if required

❑ Use page numbers, if required

❑ Adjust the margin size

❑ Confirm that the nomenclature is correct

❑ Check spelling

❑ Determine whether the results and discussion are separate sections or included together in one section

Title Page

- ❑ Verify the allowed title length
- ❑ Determine whether a running or short title is needed
- ❑ Check whether Keywords are needed
- ❑ Confirm whether a list of abbreviations is needed
- ❑ Ensure that all authors are listed
- ❑ Make sure the author's names and address are in the correct format
- ❑ Include all corresponding author information

Abstract

- ❑ Confirm the word limit
- ❑ Determine whether a structured or unstructured abstract is needed

References

- ❑ Confirm that the in-text citation format is correct
- ❑ Verify that all references cited in the text are included in the reference list
- ❑ Make sure that all references in the reference list are cited in the text
- ❑ Determine whether the references are formatted correctly
- ❑ Check the accuracy of the references

Tables and Figures

- ❑ Ensure that the in-text mention of figures and tables is formatted correctly
- ❑ Determine whether the tables and figures are located in the correct location
- ❑ Verify that the correct fonts and font size are used in the tables and figures
- ❑ Confirm numbering format for tables and figures (Roman or Arabic)
- ❑ Ensure that the size of figures and tables are correct
- ❑ Check that the correct file format is used (pdf, jpeg, gif, etc.)
- ❑ Determine the type of list for table titles and figure legends
- ❑ Make sure that all tables and figures are mentioned in the text
- ❑ Determine whether vertical lines are allowed in tables

Other

- ❑ Determine whether a conflict of interest statement is needed
- ❑ Check to see whether funding sources are required
- ❑ For medical manuscripts : Include an ethical and patient approval statement