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**Methods. Results.**

**PLAN**

**1.Methods**

**2. Break ice between the readers and the Methods section**

**3.Results**

**Methods**

The Methods section of a research article is like a roadmap leading to the core of the research, guiding the readers through the actual journey the authors took to reach their destination. In the manuscript, this section contains the essential details for other scientists to replicate the experiments of the study and help the common readers to understand the study better.

The descriptive nature of this section may make it seem one of the easiest parts of a manuscript to write. However, this is also the part, where the details are often missed while writing, and sometimes during reading due to its highly technical nature’.

In this article, we will share some tips to make the Methods section of your manuscript interesting and informative. While the article uses examples mostly from the biomedical and clinical research studies, authors from other fields too would find the tips useful for preparing their next manuscript.

**Break ice between the readers and the Methods section**

First, let’s ponder over the issue of the perception of boredom we often associate with the Methods section of an article. It may be the names of the reagents and instruments, separated by some numbers in terms of some concentrations or the technical terminologies that make the reading a heavy-duty task. Listed below are some useful ways of breaking the ice between the Methods section and the readers:

**1. Explanation**: Usually, each paragraph or subsection of the Methods section talks about a specific experiment. Early in each paragraph, explain the rationale behind your choices of that particular experiment.; for example, why you used a certain compound, a specific strain of mice as the experimental model or the particular concentration of that key reagent.

For clinical research, providing a detailed rationale for selecting the exclusion or inclusion criteria can be a good idea to present early in the Methods section. If you took a conventional or widely used method, you certainly don’t need to appear stating the obvious, but for less conventional approaches sharing your reasoning of the study design instantly makes the readers curious and engaged with your paper.

**2. Visual presentation**: To help the readers follow the study design or methodology better, visual elements like the schematic diagram, flowchart, and table can be used in this section. They help in breaking the monotony and making the absorption of complex information easy.

**The dos and don’ts of writing the Methods section**

Secondly, the information in the methods section is closely scrutinized by the journal editors and peer reviewers to assess whether the most appropriate technique was used to reach your research goal. While every detail of your experiment need not be included, the essential and critical steps should be well described to receive a positive peer review.

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**2. Structure the section so that it tells the story of your research**: All the experiments should be presented in a logical manner that helps the reader retrace the gradual and development and nuances of the study. A useful way of achieving this is to describe the methods in a chronological order of the experiments. For example: for a clinical trial, you may start with the setting and time of the study (the beginning and termination dates of the study), followed by the details of the patient recruitment (Number of subjects/patients etc.), study design (prospective, retrospective or other), randomization (if any), assigning into groups, intervention, and describing the techniques used to collect, measure, and analyse data.

**3. Follow the order of the results:**To improve the readability and flow of your manuscript, match the order of specific methods to the order of the results that were achieved using those methods.

**4. Use subheadings:**Dividing the Methods section in terms of the experiments helps the reader to follow the section better. You may write the specific objective of each experiment as a subheading. Alternatively, if applicable, the name of each experiment can also be used as subheading.

**5. Provide all details meticulously:**Provide the details that you considered while designing the study or collecting the data because the smallest variations in these steps may affect the results and interpretation of their significance. When employing the outcome measures, the readers would like to know the information regarding validity and reliability. The correct way of reporting the reliability and the validity depends on the specific research design. Usually, information from existing literature is presented to support for the reliability and the validity of a measure.

Carefully describe the materials, equipment (like testing instruments and technical equipment), or stimuli used in the experiment. If your study involved a survey or any psychological assessment, mention the questionnaire, scoring methods, and validation of scales with every possible detail.

Also, be careful about one [common manuscript error](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3474299/) i.e. not mentioning the sample size estimation (whenever relevant). Although the estimated sample size is computed before the actual study starts, it helps the reader assess the expected change in the outcome variables and the number of subjects needed to detect that change within a certain confidence range. Similarly, mentioning power calculation is a critical point to be mentioned in the Methods section.

**6. Mention the ethical approval:**If relevant, early in the Methods section mention whether your study was approved by the ethics committee or institutional review board, and whether you have received oral/ written informed consent from the patients or the guardians.

**7. Specify the variables**: Clearly mention not only the control variables, independent variables, dependent variables but also if there were any extraneous variables that might influence the result of your study. For example, in a tutorial on learning how to write ‘Research Methodology’, one group is provided with a traditional text while the other group is provided with an interactive online tool. However, if some participants already have prior knowledge of ‘how to write the Methods section’, this pre-knowledge will act as an extraneous variable.

**8. Statistical analysis:**In this section, describe all statistical tests, levels of significance, and software packages used to conduct the statistical analysis. You may also consult the biostatistician of your team to receive help to write this section. Don’t forget to indicate if the recommendations of a knowledgeable and experienced statistician were considered. Finally, it is important to provide the justification of the preferred statistical method used in the study. For example, why the author is using a one-tailed or two-tailed analysis.

The Methods section provides description of methods, procedures, materials, and subjects (if applicable) used in a study. The characteristics of this part of a research paper vary across fields. As Swales and Feak (1994: 165), for example, point out, the Methods sections in social sciences are rather detailed and contain justifications and explanations, because methodology in these disciplines is often an important and debated issue. However, in hard sciences, biological and medical research, standard methods and practices are much more widely available.

Below are two Methods sections of the papers in the fields of applied linguistics and applied mechanics. The goal of the first paper is to assess the effect of content-based English instruction, that is the instruction that uses materials from mainstream academic disciplines (e.g., psychology or biology) as the medium of English language teaching. The second paper aims at improving possible prediction of creep rates in certain kinds of materials. Read through the texts and answer the questions that follow.

A) Subjects The subjects in this study were ESL students at Kingsborough Community College (KCC) .... These students came from a wide variety of ethnic, cultural and linguistic backgrounds and were representative of the general ESL population at KCC. Most of the ESL students in this study were Russian, some were Haitian and Hispanic, and the remainder were Asian. ... There was a total of 184 students in the original subject sample. These students were randomly selected from ESL 09 courses designated as contentbased or as non-content-based. This designation was determined by the type of textual material used in instruction. Ninety-one students were assigned to the experimental, or content-based, group and to the control, or non-contentbased, group

 **Results**

The results section of the research paper is where you report the findings of your study based upon the information gathered as a result of the methodology [or methodologies] you applied. The results section should simply state the findings, without bias or interpretation, and arranged in a logical sequence. The results section should always be written in the past tense. A section describing results “findings” is particularly necessary if your paper includes data generated from your own research.

**When formulating the results section, it's important to remember that the results of a study do not prove anything**. Research results can only confirm or reject the research problem underpinning your study. However, the act of articulating the results helps you to understand the problem from within, to break it into pieces, and to view the research problem from various perspectives.

**The page length of this section is set by the amount and types of data to be reported**. Be concise, using non-textual elements, such as figures and tables, if appropriate, to present results more effectively. In deciding what data to describe in your results section, you must clearly distinguish material that would normally be included in a research paper from any raw data or other material that could be included as an appendix. In general, raw data should not be included in the main text of your paper unless requested to do so by your professor.

**Avoid providing data that is not critical to answering the research question**. The background information you described in the introduction section should provide the reader with any additional context or explanation needed to understand the results. A good rule is to always re-read the background section of your paper after you have written up your results to ensure that the reader has enough context to understand the results [and, later, how you interpreted the results in the discussion section of your paper].

**I. Structure and Approach**

**For most research paper formats, there are two ways of presenting and organizing the results**.

1. **Present the results followed by a short explanation of the findings**. For example, you may have noticed an unusual correlation between two variables during the analysis of your findings. It is correct to point this out in the results section. However, speculating as to why this correlation exists, and offering a hypothesis about what may be happening, belongs in the discussion section of your paper.
2. **Present a section and then discuss it, before presenting the next section then discussing it, and so on**. This is more common in longer papers because it helps the reader to better understand each finding. In this model, it can be helpful to provide a brief conclusion in the results section that ties each of the findings together and links to the discussion.

**In general, the content of your results section should include the following elements:**

1. An introductory context for understanding the results by restating the research problem that underpins the purpose of your study.
2. A summary of your key findings arranged in a logical sequence that generally follows your methodology section.
3. Inclusion of non-textual elements, such as, figures, charts, photos, maps, tables, etc. to further illustrate the findings, if appropriate.
4. In the text, a systematic description of your results, highlighting for the reader observations that are most relevant to the topic under investigation [remember that not all results that emerge from the methodology that you used to gather the data may be relevant].
5. Use of the past tense when refering to your results.
6. The page length of your results section is guided by the amount and types of data to be reported. However, focus only on findings that are important and related to addressing the research problem.

**2.Using Non-textual Elements**

* Either place figures, tables, charts, etc. within the text of the result, or include them in the back of the report--do one or the other but never do both.
* In the text, refer to each non-textual element in numbered order.
* If you place non-textual elements at the end of the report, make sure they are clearly distinguished from any attached appendix materials, such as raw data.
* Regardless of placement, each non-textual element must be numbered consecutively and complete with caption [caption goes under the figure, table, chart, etc.]
* Each non-textual element must be titled, numbered consecutively, and complete with a heading [title with description goes above the figure, table, chart, etc.].
* In proofreading your results section, be sure that each non-textual element is sufficiently complete so that it could stand on its own, separate from the text.

**3. Problems to Avoid**

**When writing the results section, avoid doing the following**:

1. **Discussing or interpreting your results**. Save all this for the next section of your paper, although where appropriate, you should compare or contrast specific results to those found in other studies [e.g., “Similar to Smith [1990], one of the findings of this study is the strong correlation between motivation and academic achievement....”].
2. **Reporting background information or attempting to explain your findings**; this should have been done in your Introduction section, but don't panic! Often the results of a study point to the need to provide additional background information or to explain the topic further, so don't think you did something wrong. Revise your introduction as needed.
3. **Ignoring negative results**. If some of your results fail to support your hypothesis, do not ignore them. Document them, then state in your discussion section why you believe a negative result emerged from your study. Note that negative results, and how you handle them, often provides you with the opportunity to write a more engaging discussion section, therefore, don't be afraid to highlight them.
4. **Including raw data or intermediate calculations**. Ask your professor if you need to include any raw data generated by your study, such as transcripts from interviews or data files. If raw data is to be included, place it in an appendix or set of appendices that are referred to in the text.
5. **Be as factual and concise as possible in reporting your findings**. Do not use phrases that are vague or non-specific, such as, "appeared to be greater or lesser than..." or "demonstrates promising trends that...."
6. **Presenting the same data or repeating the same information more than once**. If you feel the need to highlight something, you will have a chance to do that in the discussion section.
7. **Confusing figures with tables**. Be sure to properly label any non-textual elements in your paper. If you are not sure, look up the term in a dictionary.

The Results section reports data or information obtained in the course of a study. In this part of the research paper, writers put forward their new knowledge claims through the demonstration, explanation, and interpretation of the findings. The presentation of results is typically followed by the Discussion section, although the division between these two sections is not rigid, and they may appear together as one structural part of a research paper. Even if the Results section is formally separated from the Discussion, it often contains some comments on the data. The purpose of such comments is to provide a timely response to the critical remarks or questions about results or methods that the author of a paper is likely to anticipate. The authors of a textbook on writing research reports, Robert Weissberg and Suzanne Buker, suggest a possible model for the Results section, which consists of three moves, or, as the authors call them, "three basic elements of information" .