Trends in Scholarly Publishing

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Reviewer Perspective on the Essentials of Scientific Experiments Based Research Articles

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ABSTRACT
Scientific research papers must be published to visualize the results obtained by the experiments conducted as part of their research work. Every scientific article must have some experimental results. These results are a small step of the research work carried out by the researchers. All the experiments-based research articles must follow some of the minimum structure when writing them. Most of the articles have utilized the standard format which is recognized by peer-reviewed journals. Some of the articles are not using the proper structure. This research work must discuss the basic requirements for the preparation of scientific research papers. Also, summarize some of the rules about how to prepare papers that are easily accepted by the indexed journals. The drawbacks and advantages are also discussed in this work to write experimental papers effectively and efficiently. A commonly acceptable format for writing the articles is specified and suggested based on their merits and demerits in this work.

KEYWORDS
Research articles, research articles structure, scientific articles, format of scientific paper

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INTRODUCTION

Scientific research articles must be published to visualize the results which are the individual research work-based experiments. Most of the research articles written by scientific researchers are depending on their experiments. The experiments are conducted to complete the research work via their findings. The innovative information produced in the research articles is useful to other researchers who are doing their research work in the same field. Not only to showcase the experimental results, but also to know the format of writing the article, the area in which it is taken for the research, the type of article written for the requirements of the research work and the format used in it to write an efficient method. Different kinds of research articles are produced by the research community, majorly which are review articles, survey articles and original research articles. Almost all scientific articles have followed the standard format to write them. But some of the articles are not good enough in structure. These articles require writing to follow the basic structure of peer-reviewed journals.

The scientific articles were explained by producing the experimental results via tables, figures and other types of visualization techniques. Nowadays, we can easily find the basic structure of how to write an article which is available on various websites. Also, every journal must have its format. Most journals follow a specific method for the preparation of scientific articles, which is given on their journal website itself. So that the researcher can find a suitable method to write and submit their articles to journals that are easily

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accepted by the journal authorities. All kind of journals provide their own late on their websites. Simply, it can be to write the article and submit it to a journal. If the format of any paper written by the researcher used the journal format, then the article is very much identified and accepted by the journals.

Basic structure of scientific articles: Research work is a systematic investigative process engaged to increase or revise the researcher's current knowledge by discovering new facts. A scientific and systematic search for pertinent information is the key point of any research work. A research article explores new areas of investigation in a particular field and how to answer key research questions. Communicating new scientific findings in the appropriate journals is essential for any type of research work. Any scientific experiment is not complete until the results have been published in peer-reviewed journals and it should be easy to understand. A scientific article is a written and published results-oriented report which describes original research results by a way of its acceptable formats. All scientific writing must use proper English which gives the sense of its description in the fewest short words. Thus, it must be clear, simple and well-ordered communication to transmit new scientific findings.

The scientific papers are used a standard format for writing purposes. Most of the indexed journals suggested utilizing the IMRaD format for writing the article worldwide. Here, I stand for Introduction, M is the Methods, R is the Results, a (and) and D is Discussion. But, in scientific papers, most methods and results are combined into one section called as Experimental Section. The results are needed to be discussed immediately when they are listed in the paper. Therefore, the results and discussion parts are given in a single name as Results and Discussion. The essential parts of scientific articles are given in Table 1.

Table 1: Essential parts of a scientific research paper

Name	Description
Title	Concisely describe the main contents of the paper
Abstract	Summarize the most important elements of the paper
Introduction	Provide context and rationale required information for the study
Materials	Describe the experimental design used in the work and the datasets so that it is reproducible
Methods	Designate the experimental procedures, techniques, methods and formulae
Results	Results and findings should be summarized without any interpretation
Discussion	Interpret the findings of the study and judge the validity of the work
Conclusions	Conclude the research findings and innovative ideas of the research and also the future work of the research
Acknowledgment	Give credit to those who helped you with your research
References	Use proper methods for the preparation of references including all scientific papers, books and websites that you have already cited in your paper

Table 2: Websites for the format of scientific paper writing

Name of the website and title	Address of the website
Springer (writing a journal manuscript)	https://www.springer.com/gp/authors-editors/authorandreviewertutorials/writing-a-journal-manuscript/author-academy/10534936
The Library: University of Waikato (writing a scientific report)	https://www.waikato.ac.nz/library/guidance/guides/write-scientific-reports
Ecological Society of America (scientific writing made easy: A step-by-step guide to undergraduate writing in the biological sciences)	https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/bes2.1258
ResearchGate (essentials of scientific writing)	https://www.researchgate.net/publication/299597302_Essentials_of_Scientific_Writing
University of Wisconsin-Madison (writing an introduction for a scientific paper)	https://dept.writing.wisc.edu/wac/writing-an-introduction-for-a-scientific-paper/
The International Society for Optics and Photonics (10 simple steps to writing a scientific paper)	https://spie.org/news/photonics-focus/janfeb-2020/how-to-write-a-scientific-paper?SSO=1
columbia.edu (writing a scientific research article)	http://www.columbia.edu/cu/biology/ug/research/paper.html

Several websites and repositories are available to identify and use the formats of writing papers in different forms. Here, it is requiring discussion about some of the websites that have how to write articles and articles already published which had experimental results in it. First, the list extended the discussion of some of the web repositories given in Table 2.

Table 2 has an insight into some of the repositories which are available on how to write a scientific research paper. An article titled "Writing a scientific article: A step-by-step guide for beginners" explores the writing of experimental-oriented papers with a good method[1]. They give an elaborate discussion about the article's writing format. Another article has a detailed guide regarding how to publish scientific articles is shortly given on the website under the name "A guide to writing scientific papers"[2]. The article shortly discussed writing an article using a standard format. Derntl[3] explores writing a good scientific article in the research paper titled "Basics of research paper writing and publishing". In which it is discussed on the rigorous discussion of writing a paper. Amonson[4] gave a detailed study to write a manuscript in the paper "Style in scientific writing". He gave exhaustive commands on deeply writing research articles. Cargill and O'Connor[5] published a book titled as "Writing scientific research articles: Strategy and steps". They explain the basic structure of writing the research paper in simple steps and they gives some tips for scientific writing.

Requirements of scientific articles: The methods which are discussed already in the previous section are the general information about how to write a scientific paper. But in nature, all these steps are not strictly followed by researchers. Most of the researchers used some of the required formats alone. These steps are introduction, materials and methods, results and discussion and finally the conclusion. A general step involved in organizing a scientific paper is simply depicted in Fig. 1.

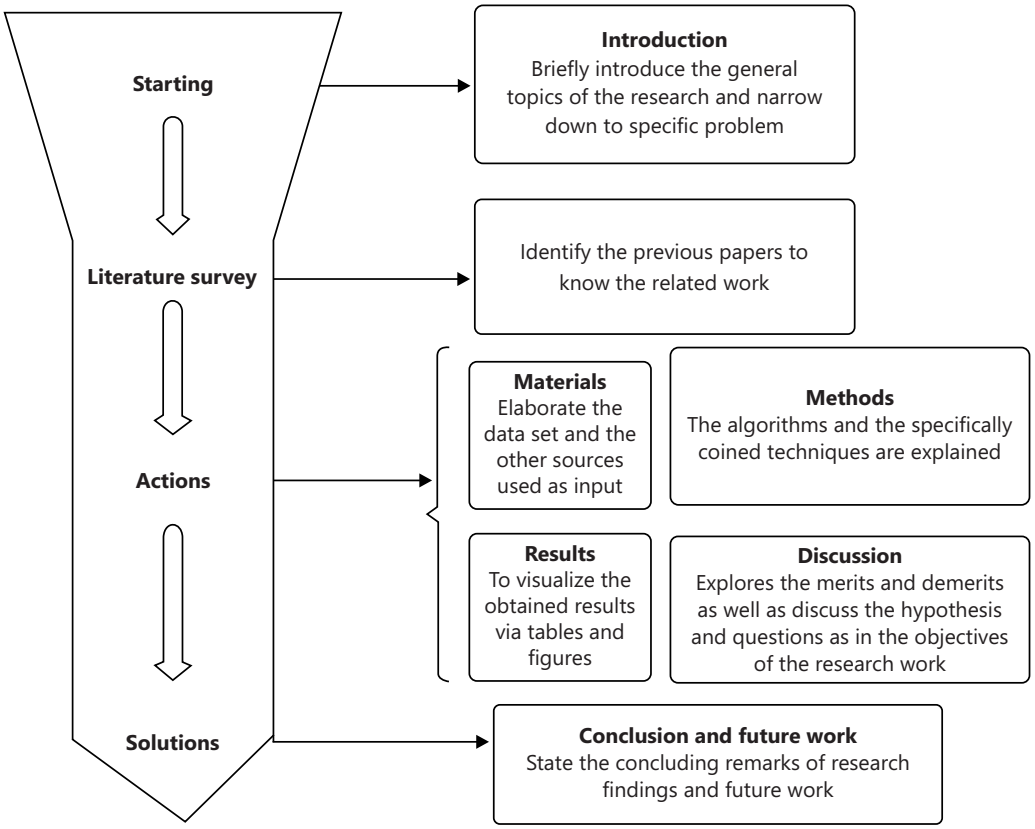


Fig. 1: Anatomy of scientific research paper

Normally, there is a general structure to write research articles in all domains. Particularly, the science domain has some limitations in showing experimental results. The science-based articles have elaborated a discussion and include a description of the data used for the research work. All kinds of research papers must have a title and a list of author names first. The title must be precise and it is produced for the first time for readers' understanding. The title should be clear, specific and brief for the exactness of the paper. After the title, articles must require an abstract. For quick reading and to summarize the entire report of your article, the abstract part is needed. The abstract should include your motives for doing the work, your methods, your findings and your conclusions. It should need to be both fascinating and easy to read.

The original research work of scientific papers sharing your results with other scientists or others' research is reviewed. Scientific papers are often structured chronologically that report experimental work organized in major sections like introduction, materials and methods, results and discussion and finally the conclusion. The conclusion section gives innovative ideas of the individual work which is carried out by the researcher. These are the most essential parts of any scientific paper:

- Introduction section has a detailed discussion and clarifies the motivation for the work presented, the major area is taken for the analysis, also the specific topic of research and prepares readers for the structure of the paper at the end
- Materials and methods section provides details about the data set used for the research, supplementary materials used, the algorithms and techniques used in the work and the required sufficient detail for other scientists to reproduce the experiments presented in the paper. This section differs from one kind of journal to other in its structure. This information is placed in an appendix in some journals because it is not what most readers want to know first
- Most important section in a scientific paper is the results and discussion section. This section presents the original results obtained in the research experiments and the same is to be discussed in detail. The researchers need to explain their results and the meaning of the results with interpretation. In most of the articles, the results and discussion section have combined and elaborately discussed about the results obtained in their research work
- Conclusion section has an in-depth research contribution of the research work via their findings. This section answers the objectives taken in the research work preliminarily. Also, this section must state that all the objectives are satisfied or not. If not, it is required to give reasons for the rejection of the results
- Apart from these discussed sections above, the other sections like abstract and references are included in all types of journal articles which appear first and last sections respectively. Almost all references must use the standard format like IEEE, MLA, APA and CMS. Nowadays, many peoples use reference managers for the preparation of references. Citing references gives an idea about your previous reading of related papers

Some case studies: Scientific papers normally have two types of audiences: the first one is the referees (Peer review teams), normally the journal editor, he or she accepts your method of findings and other types of results and then they have to decide whether your paper is suitable for publication or not. The second audiences are the journal readers, those who are reading your journal article. For the acceptance of the paper by the referees, the article must be prepared in a simple way of reading and understanding. If all these criteria are fulfilled, then the article may be cited by readers in their papers. Apart from these, the researchers must convince their readers of the article that the research presented is important, valid and relevant to other scientists in the same field. Next, some of the articles which are prepared by using the above-said information in chronological order are discussed. The merits and demerits are also considered when identifying a scientific paper.

As per the expectations of the reviewer's perspective, the article which follows the standard format when writing will be easily accepted in any kind of journal. The requirement of reviewers and editors, some of the articles are discussed here. Chuan *et al*.[6] discussed this in a research article using the suggested format in the paper. They follow the structure of the scientific paper writing and deliver the results and discussion very neatly in an appropriate method. Another article titled "Computational complexity between K-means and K-medoids clustering algorithms for normal and uniform distributions of data points"[7]. On computational performance-based analysis, the article has been well enough to utilize the general format of scientific writing. This article perfectly used the prescribed structure of the acceptable setup.

Always, any articles which are accepted for publication in reputed journals like Elsevier, Springer, ACM, IEEE Journals, etc. meet the requirements of basic writing principles. These journal publishing companies accept articles that are written using the discussed formats alone. An article produced by de Munk *et al*.[8], in which uses other than the prescribed method includes study design, horizontal analysis and threats to validity. They have given an appendix to provide the supplementary materials. A research article titled "A critical analysis of research methods and experimental models to study dentinal microcracks", which is published by Versiani *et al*.[9]. They explained large information about the experimental part alone. They did not follow the appropriate method, but content-based information was available in it. A research paper by Perumal and Velmurugan[10] was published in an International Journal using the accepted method to describe the content of the paper. Also, the paper explores the literature survey and other required information in other arrangements.

A research article published by Liu and Wang[11] in Hindawi publications in the journal Wireless Communications and Mobile Computing. This paper has enough required structure to complete the paper writing. An experiment-oriented scientific article published in Springer journal named "Research on Biomedical Engineering" by the researchers de Freitas Barbosa *et al*.[12]. This article strictly follows the instructions discussed above and fulfills the entire concept of a scientific paper. Thambusamy and Umasankar[13] published a research article named "Prediction of heart disease using name entity recognition based on back propagation and whale optimization algorithms". They used the correct format for the preparation of the paper perfectly. A research work titled "An analysis of fuzzy C means and logical average distance measure algorithms using MRI brain images" by Naveen and Velmurugan[14] in the International Journal of Computing Algorithms. The researchers followed the partial structure of the IMRaD format.

An article titled "Applicability of clustering and classification algorithms for recruitment data mining" by Sivaram and Ramar[15]. These researchers do not apply the journal's scientific research format and instructions. A survey work by Latha and Velmurugan[16] in the International Journal of Data Mining Techniques and Applications named "Effective approaches of classification algorithms for text mining applications". This work did not use the instructions given by the journal. Experimental work was published in the Indian Journal of Science and Technology by Manimaran and Velmurugan[17]. The researchers perfectly used the instructions discussed above in this article. An experimental work carried out by Shirodkar and Pereira[18] titled "Determining students performance using the tool of artificial neural network" in the International Journal of Innovative Research and Development. This work is experimental, but this does not follow the scientific research format. Navitha and Velmurugan[19] published a research work titled "A survey on the simulation models and results of routing protocols in mobile *Ad-hoc* networks". They have not followed the format which is discussed above in this research work.

A research work carried out by Mahalakshmi and Velmurugan[20] titled "A novel approach to find tumor in MRI brain images using image segmentation techniques" in the International Journal of Control Theory and Applications. This article does not follow the IMRaD format which is discussed in this article and some other methods are used. Arunachalam and Velmurugan[21] carried out a research work titled "Analyzing student performance using evolutionary artificial neural network algorithm" in the International Journal

of Engineering and Technology. In this research work, the researchers have used some other methods in their work. An article named "Educational data mining: A survey from 1995 to 2005" in Expert Systems with Applications is Elsevier publications by Romero and Ventura[22]. Though it is a survey paper, the researcher used the format which applies to the survey research work. An experimental work done by DeepaLakshmi and Velmurugan[23] titled "Benchmarking attribute selection techniques for microarray data" in ARPN Journal of Engineering and Applied Sciences. These researchers did not follow the scientific research format but followed the format which is satisfactory to that journal.

A research work titled "Analysis of student academic performance using clustering techniques" by Govindasamy and Velmurugan[24]. This work does not apply the instructions given by the International Journal of Pure and Applied Mathematics. Sukassini and Velmurugan[25] carried out a scientific research work named "Ascertaining abnormal regions in mammogram images using gravitational search local map view technique" in the International Journal of Innovative Technology and Exploring Engineering. The researchers have done justice to the format which applies to the journal. Mishra *et al.*[26] carried out a research work titled "Mining students' data for performance prediction" which is published at Fourth International Conference on Advanced Computing and Communication Technologies. This research work carries the scientific format and other applicable methods for the experimental work. Another work carried out in the International Journal of Advanced Science and Technology by Velmurugan and Hemalatha[27] titled "Mining implicit and explicit rules for customer data using natural language processing and apriori algorithm". This research work does not apply the instruction which is given above in this work.

Other researchers named SriPradha *et al.*[28] carried out a research article named "Factors influencing the impact of technological innovations on localized adult education" in the Journal of Critical Reviews. The researchers followed the instruction given by the journal and did perfect work for the scientific research. A survey work by Hogie *et al.*[29] titled "An overview of MANETs simulation" in Electronic Notes in Theoretical Computer Science which is also an Elsevier publication. These researchers have carried out the instructions used for survey work. An experimental research work carried out by Zhang *et al.*[30] titled "An improved electromagnetism-like mechanism algorithm for constrained optimization" in Expert Systems with Applications. This work carries the other scientific methods which apply to this experimental work. A research work by Fang and Zhan[31] discusses Sentiment analysis using product review data. In which the scientific format is not properly used. But they used other methods to describe the research results.

From Table 3, it is observed that many of the articles followed the prescribed format and some others did not meet the instructions. Not only from the articles taken for the analysis in this work but other articles also available in various repositories meet highly acceptable formats when writing it. Some of the articles explain a maximum level of its results based on their experiments. Only a few articles are discussed in Table 3 and discussed their advantages and demerits. Figure 2 is the pictorial representation of Table 3 entries which shows small information about the articles which are carried out in this work. It is easy to understand that the number of articles that followed the scientific format is less than the other formats.

As per the discussion above, most of the reviewers expect scientific research articles in the format of IMRaD. But it is not possible to find all the scientific articles that followed the same format. Some of the articles have utilized and some other articles are not. The basic requirements of any kind of results analysis-oriented papers written by many researchers' meet with the accepted format when they write an article. Always, a reviewer expects articles that have enormous discussion about the results in any of the scientific articles. They considered results-based in-depth analysis of the findings of scientific results and discussion for the publication of the articles. The same thing is the expectation of standard journal publishing companies like Elsevier, Springer, Inderscience, etc. A good scientific article produces a clear-cut idea about the new innovative findings via their scientific experiments which are reflected in the articles.

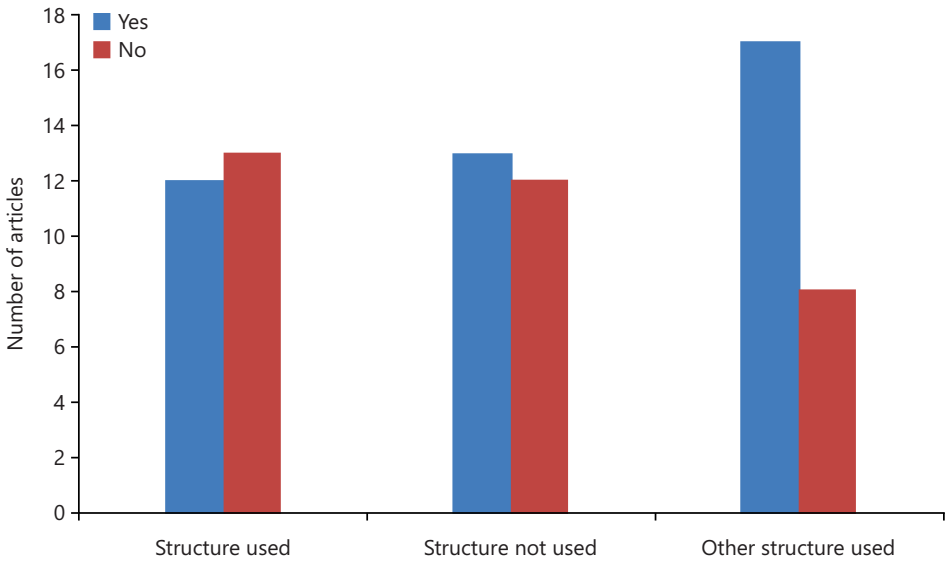


Fig. 2: Number of correct and incorrect articles

Table 3: Requirement analysis of articles

Authors name	Structure used	Structure not used	Other acceptable methods used
Chuan *et al.*[6]	Yes	No	Yes
Velmurugan and Santhanam[7]	Yes	No	No
de Munk *et al.*[8]	Yes	No	No
Versiani *et al.*[9]	Yes	No	Yes
Perumal and Velmurugan[10]	Yes	No	Yes
Liu and Wang[11]	Yes	No	Yes
de Freitas Barbosa *et al.*[12]	Yes	No	Yes
Thambusamy and Umasankar[13]	Yes	No	Yes
Naveen and Velmurugan[14]	No	Yes	Yes
Sivaram and Ramar[15]	No	Yes	Yes
Latha and Velmurugan[16]	No	Yes	No
Manimaran and Velmurugan[17]	Yes	No	No
Shirodkar and Pereira[18]	No	Yes	No
Navitha and Velmurugan[19]	No	Yes	No
Mahalakshmi and Velmurugan[20]	No	Yes	Yes
Arunachalam and Velmurugan[21]	No	Yes	Yes
Romero and Ventura[22]	No	Yes	Yes
DeepaLakshmi and Velmurugan[23]	No	Yes	Yes
Govindasamy and Velmurugan[24]	No	Yes	No
Sukassini and Velmurugan[25]	Yes	No	No
Mishra *et al.*[26]	Yes	No	Yes
Velmurugan and Hemalatha[27]	No	Yes	Yes
SriPradha *et al.*[28]	Yes	No	Yes
Hogie *et al.*[29]	No	Yes	No
Zhang *et al.*[30]	No	Yes	Yes
Fang and Zhan[31]	No	Yes	Yes

CONCLUSION

Normally, a reviewer's perspective is always depending on individual expectations and based on their views when they review a scientific article. But most of the peer review team expects some criteria which meet in the written articles. The articles written for solving recent scientific problems are the main point that is to be considered during the review. Technologies have enormous growth which runs the world and alternate day-to-day human activities. Human life depends on recent scientific innovations. Everything is possible to attain in the real life of any person. Scientific papers are the backbone of recent research in all areas of real life. Without scientific research, living in the current world is impossible. It is essential when

writing scientific articles, that scientists need more attention to producing scientific results because these results create a high impact on people's life. Writing scientific research papers using the current advised format which is discussed in this work yields more readers and create a high impact on the published work. Also, it is confirmed that the article is cited in international-level scientific journals with a high Impact Factor. The other researchers can easily observe the information provided in the article and recommend it to other persons also. The other types of writing the article for quantitative and qualitative papers are discussed in another work in the future.

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