

BASICS OF RESEARCH PAPER WRITING AND PUBLISHING

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Abstract

Publishing research results is an integral part of a researcher's professional life. However, writing is not every researcher's favourite activity, and getting a paper published can be a very tedious and time-consuming process. Fortunately, many of the obstacles along the writing and publishing path can be avoided by following some simple guidelines and practices. This paper presents a synthesis of guidelines found in literature about structuring and writing scientific papers. The paper outlines the process of publishing research papers in journals and conference proceedings, aiming to provide early-stage researchers with a handy introduction to essential issues. The paper takes an interdisciplinary stance by giving examples from technology-enhanced learning research and borrowing from literature in social, natural and computing sciences.

***Keywords:** paper writing; publication process; paper structure; journal publications; conference publications; writing tips; scientific practice.*

1. Introduction :

The dissemination of research results and findings is an integral part of the research process and the career in academia. Researchers write to keep records of their work for themselves, but more importantly for readers and peers who are expecting a standard form, language and style when reading research papers. Writing in a scientific style may be hard in the beginning for novices, but clear communication and concise writing for a scientific audience can be trained. Scientific papers have to meet certain requirements regarding how the paper was written and the way it is published. He stresses that the process leading to publication is equally important as the content, style and organisation of the published paper.

A scientific paper must be a valid publication, i.e. it must be published in the right place, like in a peer-reviewed journal or in a top-ranked conference. The publication outlet nowadays heavily relies on the field of research, for instance in

computer science, papers in proceedings of some of the top-ranked conferences are equally or even more prestigious than articles in highly ranked journals, while in the natural sciences, conference publications have little to no value in the track record.

The main objective of this paper is to serve early-stage researchers with a handy introduction to the structural components of scientific papers and the processes that lead to their publication. This paper assumes no explicit disciplinary perspective. It borrows from the literature on paper writing and publishing and gives examples from the social, natural and technical sciences, since the prestige associated with different types of publications varies greatly by discipline.

2. Structure of scientific papers

The structure of a research paper comprises three core parts, namely introduction, body and discussion. The progression of the thematic scope of a paper within these parts typically follows a pattern called the '**Hourglass Model**'

The introduction leads the reader from general motivations and a broad subject to a particular research question that is tackled in the body of the paper. The body of the paper stays within a tight thematic scope and describes the research methods and results in detail.

2.1 title: The title is the part of a paper that is read the most; it is usually read first and most often, it is the only thing that is read. Electronic indexing services rely heavily on the accuracy of the title to allow users to find papers that are relevant to their research.

When the title is too long, it usually contains too many waste words such as 'Investigations on' at the beginning. On the other hand, titles that are too short often use words which are too general. For instance, the title "Writing Reports" does not provide any information on which kind of reports the paper is focusing on. Thus, according to **Peat et al. (2002)**, effective titles identify the main issue of the paper; begin with the subject of the paper; are accurate, unambiguous, specific and complete; do not contain abbreviations unless they are well known by the target audience, e.g. HTML or CPU in titles of computer science papers or ADHD in titles of psychology papers; attract readers.

2.2 Abstract : Basically, an abstract comprises a one-paragraph summary of the whole paper. Abstracts have become increasingly important, as electronic publication databases are the primary means of finding research reports in a certain subject area today.

According to **Day (1983)**, there are two basic types of abstract:

- An informative abstract extracts everything relevant from the paper, such as research objectives addressed, methods

employed in solving the problems, results obtained and conclusions drawn. Such abstracts may serve as a highly aggregated substitute for the full paper.

- On the other hand, an indicative or descriptive abstract rather describes the content of the paper and may thus serve as an outline of what is presented in the paper. This kind of abstract cannot serve as a substitute for the full text.

2.3 Introduction: The introduction serves the purpose of leading the reader from a general subject area to a particular field of research. Three phases of an introduction can be identified (Swales, 1993):

- 1 Establish a territory: bring out the importance of the subject and/or make general statements about the subject and/or present an overview on current research on the subject.
- 2 Establish a niche: oppose an existing assumption or reveal a research gap or formulate a research question or problem or continue a tradition.
- 3 Occupy the niche: sketch the intent of the own work and/or outline important characteristics of the own work; outline important results; and give a brief outlook on the structure of the paper.

2.4 Body: The body of a paper reports on the actual research done to answer the research question or problem identified in the introduction. It should be written as if it were an unfolding discussion, each idea at a time (**Dees, 1997**). Often, the body comprises several sections and subsections, whereas structure, organisation and content depend heavily on the type of paper, publication outlet, publisher and the creativity of the authors.

2.5 Discussion

- A presentation of background

information as well as recapitulation of the research aims of the study.

- A brief summary of the results, whereas the focus lies on discussing and not recapitulating the results.
- A comparison of results with previously published studies.
- Conclusions or hypotheses drawn from the results, with summary of evidence for each conclusion.
- Proposed follow-up research questions and outlook on further work.

2.6 References: Embedding the own work in related literature is one of the essential parts of research writing. This is achieved by citing related work within the text and by listing all cited references at the end of the paper. Different publishers require different formats or styles for citing a paper in the text and for listing references. The most commonly used referencing systems are variations of the following:

(a) Name and year system: References are cited by their respective authors and the year of publication, e.g. 'Chuck and Norris (2003) define ...'. This system is very convenient for authors, as the citation does not have to be changed when adding or removing references from the list. The fact that sentences become hard to read when subsequently citing many references in one single parenthesis this way is one negative aspect for readers.

(b) Alphabet-number system: This system lists the references in alphabetical order and cites them by their respective number in parentheses or (square) brackets, e.g. 'As reported in [4], ...'. This system is relatively convenient for readers, as it does not break the flow of words while reading a sentence with many citations. On the other hand, the author has to keep an eye on the references

cited in the text as their numbers may change when the reference list is updated.

(c) Citation order system: This system is similar to the alphabet-number system with one major difference: the reference list is not sorted alphabetically, but in the order of appearance (citation by number) in the text.

3. Concluding remarks: The objective of this paper was to give an introduction to basic issues of writing and organising scientific papers as well as on the process of getting a research paper published in a journal or in conference proceedings.

Technology-enhanced learning is a young and interdisciplinary research area. Hence, the craft of writing and publishing papers in technology-enhanced learning conferences and journals is less mature than in established disciplines from the social and natural sciences. However, covering all these disciplinary facets in detail is beyond the scope of this paper. The paper therefore aimed to provide early-stage researchers with an introductory guide to this complex matter, raising awareness of the fact that very simple rules and guidelines might have a lasting impact on the personal career and science at large.

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