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## Writing a Research Paper From Beginning to End

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# Writing a Research Paper From Beginning to End

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## ABSTRACT

Universities take pride in the research their school produces, as it demonstrates their dedication to advancing knowledge and pushing the boundaries of various fields, not just STEM. Research by definition is an inquiry using current sources to guide and establish new facts in any field of study. Undergraduate student research falls under this umbrella of advancement and is a critical component of the research culture at any institution. A research paper includes four important sections: the abstract, introduction, methods, and results section. Each section takes the audience through the steps implemented by the student to answer their research question and conclude with their findings. Upon completion of the research paper, students open themselves up to the opportunity of publishing their work in academic research journals. This article aims to address how to write a research paper that is suitable for publication..

**KEYWORDS:** research paper structure, undergraduate research, how to write a research paper, parts of a research paper

## INTRODUCTION

Universities take pride in the research their school produces, as it demonstrates their dedication to advancing knowledge and pushing the boundaries of various fields, not just STEM. Research by definition is an inquiry using current sources to guide and establish new facts in any field of study. Undergraduate student research falls under this umbrella of advancement and is a critical component of the research culture at any institution. A research paper includes four important sections: the abstract, introduction, methods, and results section. Each section takes the audience through the steps implemented by the student to answer their research question and conclude with their findings. Upon completion of the research paper, students open themselves up to the opportunity of publishing their work in academic research journals. This article aims to address how to write a research paper that is suitable for publication.

## BRAINSTORMING & LIBRARY RESOURCES

Brainstorming – gathering one’s thoughts and determining organizational structure – is an important first step in the writing process. Whether a student is about to start a research project and is looking for new ideas, or a student is about to complete their project and ready to begin writing an article, brainstorming is a useful tool. Here at the University of Louisville (UofL), students have access to a collection of resources designed to help with brainstorming through the university library system.

For students beginning their projects, spending time with the library’s online research databases can be helpful in developing research ideas. A useful place to start exploring is the University Libraries’ “Subject Guides,” a site found under “Quick Tools” of the library’s homepage. These “Subject Guides” allow students to click on a general topic, such as sustainability or nursing, and be taken to a collection of databases and resources for that specific topic. These databases include EBSCO

Web, JSTOR, and Access Medicine. Within these databases, students can find resources like peer-reviewed articles, case studies, speeches, and textbooks. All of the databases are free for students, faculty, and staff.

Familiarity with current research in the field is vital not only to be an informed researcher, but also in developing a student’s own study. For example, by looking at an article’s section about implications for future research, a student might find ideas for a research question they can explore. Similarly, if a student is working with a faculty member or lab, they should become familiar with the lab’s previous research before embarking on their own research. Students can find UofL-affiliated research either through library databases or through the University of Louisville’s Institutional Repository (ThinkIR). This resource compiles most of the research done by UofL’s research centers, faculty, and both graduate and undergraduate students. Library research appointments are another helpful resource for students as they begin the writing process. At

UofL, any student any student can meet with a librarian who is an expert in their respective field. At these appointments, the librarian will assist the student on how to navigate the library's databases and help them sort through information to find relevant sources about their topic. To make an appointment, students should start at the UofL libraries homepage and click "[Ask a Librarian](#)" then "[Meet with a Librarian](#)." The link will direct them to a page where they may narrow down the list of librarians based on their specific needs. There are many different disciplines covered by these specialized librarians, like microbiology, psychology, and physics. After a student has decided on a librarian, they may either click the "Schedule Appointment" option or use the provided contact information. These research appointments are a great way for students to learn how to utilize the available resources and to receive feedback from someone knowledgeable in their field.

## STRUCTURE OF A RESEARCH PAPER AND TIPS FOR EDITING

As previously mentioned, the brainstorming stage is an opportunity to define the scope of one's research paper and outline the research question. A research question should be measurable, focused, and relevant to the field of study. Before beginning the writing process, it is important to consider the story that will be conveyed through the paper. Why is the research important? Who is the audience? What is being conveyed to the audience? What are the main claims as supported by the data? Outlining the goals of one's paper before writing can ease the process and facilitate seamless transitions between sections of the paper.

The structure of the paper will vary by discipline and the selected journal for

publishing. While all academic writing contains an introduction, body, and conclusion, a more detailed organizational structure commonly employed for experimental research papers is known as IMRaD. This acronym is described as follows:

**Introduction:** This is the first major section of the paper that will introduce the research topic and its relevance to the broader field of study. This section will define key terms utilized in the remainder of the paper and provide background knowledge for readers. An effective introduction will detail relevant prior research (i.e. what do we already know about this topic?) and transition into unanswered questions the paper aims to address. What should the reader expect to learn from the paper? The research approach and possible outcomes of the study should be summarized.

**Methods:** The methods section will explain how the research was performed. What information would a reader need to know in order to recreate the experiment? This section should explain the participants of the study, study design (i.e. independent vs. dependent variables), materials used, study procedure, and a description of software and statistical tests used for data analysis.

**Results:** This section should reiterate the initial research question and include the primary findings of each experiment conducted. The results section should connect back to the methods section in describing the data collection. It must report values derived from statistical tests without interpretation. This section will include tabulated data and figures such as graphs or drawings that convey the results.

**(and)**

**Discussion:** This last large section of of the paper will explore the significance of the results.

After briefly summarizing the results, information from literature sources can be used to interpret them. The discussion should explain how the study relates to prior research and touch on the limitations of the study. This section should tie back to the introduction in explaining the initial hypothesis and the relevance of this study. Future directions and new questions raised by the results should be discussed.

Because the IMRaD structure outlines experimental research, it is common to scientific articles adhering to APA (American Psychological Association) paper guidelines. While the APA formatting and citation style is most commonly employed by researchers, there are other conventions. For example, the AMA (American Medical Association) style is used for medical articles, and MLA (Modern Language Association) conventions are used in English, literature, arts, and humanities texts. These conventions dictate details such as heading and font sizing, margins, and format of citations and in-text citations. Guidelines for these styles are easily accessible on the Purdue OWL website.

While crafting an initial draft of your research paper, it is recommended that you consult others to help you edit your piece. Although online tools such as Grammarly and Trinka are available, many students and faculty benefit from the University Writing Center. Writers can schedule appointments online and identify areas of weakness on the scheduling form. Common areas of assistance include: organization/structure, integrating sources and evidence, and citing sources. Experienced consultants provide assistance at any stage of the writing process and follow-up appointments are welcome. In addition to Writing

Center employees, experienced PhD students and the Primary Investigator of a lab can assist undergraduate researchers with the writing and editing process.

## WRITING AN ABSTRACT

An abstract is a brief summary that is usually placed at the beginning of each article to help the reader quickly ascertain the paper's contents. There are several parts to an abstract. The **context or background** of the research, such as information about the circumstances that brought about this research and the importance of it. This leads into the **central question/problem**, where the description of the problem is this work attempts to solve, or the main claim or thesis. The **methodology** will include specific models or approaches used in the study or a description of the types of evidence used. The results then highlight the specific data that indicates the **results** of the project, or can be a more general conclusion. Finally, an abstract contains the **significance/implication** of the research. This aspect explains how research adds to the body of knowledge on the topic and any applications from the findings. The importance given to these different components varies on one's fields and disciplines. Use other research abstracts in a similar field as a model of which to base your own abstract.

There are several sources that discuss abstracts in more detail. Both George Mason University's and University of Wisconsin-Madison's Writing Centers' articles on "Writing an Abstract" are great resources, as well as the UofL's Writing Center's resources

## DECIDING WHAT JOURNAL TO PUBLISH IN

Once an abstract is written, it is common to submit the finished research paper to journals. Many journals are

geared towards undergraduate students; however, one should have a preferred journal in mind so as to write an article to that journal's specifications and audience. Publishing research papers to accredited journals as an undergraduate offers a multitude of opportunities from gaining experience in scholarly publication and establishing visibility for the research to expanding connections with other faculty, students, and researchers in that field of study. When exploring different journals to publish in, there are crucial factors to consider about each before deciding where to submit the paper. One vital feature in accredited journals is the use of peerreview; when examining a journal, the details and legitimacy of its peer-review process should be identifiable on the journal's website. Another factor to consider is discoverability of the journal: how accessible it is for other researchers or students, how and where the journal circulates its publishing, and if it is listed in discoverable and reputable directories. One way to determine this is to consider a journal's impact factor, which measures how often an article in that journal is cited in other work each year, giving insight into the discoverability and impact of the journal. Other factors to assess are sources the journal provides for authors, such as accessible and clear guidelines for submissions, and explicit policies for fees, licensing, and copyright.

As a starting point for this process of discovering journals, UofL offers a "Databases A-Z List," where directories for journals in various fields can be found. The university's librarians are also knowledgeable sources for finding popular and accredited journals. Outside of the university, multiple legitimate websites offer assistance in finding the right journal based on fields of study or even one's submitted abstract. Tools for finding journals are especially common on sites that work as databases that publish from multiple open access journals. Some reputable search engines are Elsevier JournalFinder, SAGE Jour-

nal Recommender, Springer Journal Suggester, and IEEE Publication Recommender.

While UofL does not offer a list of undergraduate journals, other universities have published extensive lists that can be found by searching for a schools' list of journals publishing undergraduate research papers—some of these lists are linked at the end of the article. A few popular undergraduate research journals are American Journal of Undergraduate Research, Undergraduate Research Journal, and Journal of Student Research. However, many universities fund undergraduate journals that are open to all university students to publish in. At UofL specifically, The Cardinal Edge is a faculty and peer-reviewed research journal that works to publish UofL undergraduate research papers, reviews, and reports in all fields of study. Publishing research can seem like a daunting or overwhelming task; however, with the right sources, the rewarding work of publishing research can be easily navigated. By allowing professional scholarly publication experience, expanding of connections within a university and externally with various researchers in a discipline, and establishing a foothold in the realm of research for a certain field, publishing a research paper can be a valuable final step of the research paper process.

## CONCLUSION

Undergraduate research is increasingly prominent and is recognized in applications for jobs, preprofessional programs, and graduate schools. The entire process, from posing the question, developing a method, and presen-

ting a new perspective/solution on a topic, showcases the recursive nature of research and how it molds critical thinkers. During the writing process, challenges will inevitably occur, but there are a range of resources available to help students overcome these roadblocks. Students are constantly gaining more from the research process and developing soft skills of critical thinking, problem-solving, and creativity and hard skills of working with professional databases, different citation methods, and writing styles. The more exposure students have to reading and writing academic papers the more well-versed they become in the field.

## HELPFUL LINKS

### Helpful Links:

Brainstorming & Library Resources:

- [UofL Library Subject Guides](#)
- [ThinkIR](#)
- [Meet with a Librarian](#)

Structure of a Research Paper and Editing:

- [How to Write APA Style Research Papers](#)

Writing an Abstract:

- [The Writing Center | Writing an Abstract | Writing In...](#)
- [Writing an Abstract for Your Research Paper](#)

Choosing a Journal:

- [Journals that Publish Research Conducted by Undergraduate Students](#)
- [https://library.sacredheart.edu / undergradpublishing/journals](https://library.sacredheart.edu/undergradpublishing/journals)
- [https://libguides.gwu.edu/ c.phpg=259035&p=1729128](https://libguides.gwu.edu/c.phpg=259035&p=1729128)
- [https://www.american.edu/sis/ undergrad/research/ publication .cfm](https://www.american.edu/sis/undergrad/research/publication.cfm)
- <http://www.ajuronline.org/>
- [https://undergraduateresearch.o rg/](https://undergraduateresearch.org/)
- [https://www.jsr.org/ index.php/path](https://www.jsr.org/index.php/path)