Research in Surgery

How to Read a Paper

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Abstract:

Most of us have our own way of reading an article. Most of us go to the conclusion after reading the title and then we may read the entire article. The following article is a comprehensive guide to reading articles.

The article currently before you is authored by Dr. Keshav from the University of Waterloo, Canada. I would like to express my sincere gratitude to my esteemed colleague, Mr. Mohammad Heydari, for recommending this article, as well as to Dr. Keshav for granting me permission to translate it.

Researchers dedicate a significant amount of time to reading scholarly articles; however, the essential skill of effective reading is rarely taught, resulting in considerable waste of time and energy. This article aims to introduce a systematic three-step method for reading research articles and to outline a structured approach for conducting literature reviews.

Introduction

Researchers frequently engage in reading articles for diverse purposes, including preparation for conferences or classes, staying informed about recent developments in their field, or conducting literature reviews in emerging areas of research. A typical researcher may invest hundreds of hours annually in reading articles.

Mastery of an efficient reading method is an indispensable skill that is often acquired through trial and error, particularly by first-year graduate students who might experience frustration and disillusionment with the inefficiencies of their reading strategies.

For many years, I have employed a straightforward method for effectively studying academic articles. This article delineates a three-step approach to reading research papers and its application in literature reviews.

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Three-Step Method

The central premise of this method is to approach the article in three distinct stages, rather than reading it linearly from start to finish. Each stage has specific objectives and lays the groundwork for the subsequent stage. The first stage is designed to provide a general overview of the article; the second stage facilitates a comprehensive understanding of its content; and the third stage allows for an in-depth analysis.

Stage One

Initial Overview Commence with a rapid examination of the article to obtain a broad understanding of its content. You may choose to revisit certain sections multiple times as you proceed. This initial stage should require approximately five to ten minutes and includes the following steps:

1- Carefully read the title, abstract, and introduction of the article.

2- Review the section and subsection headings while briefly bypassing the detailed content for the time being.

3- Skim through any mathematical content, if applicable, to appreciate the foundations and principles underlying the theories presented.

4- Read the conclusion section to grasp the article's key takeaways.

5- Quickly peruse the references, making note of any articles you may have previously encountered.

By the conclusion of this stage, you should be able to address the following five categories of questions concerning the article:

1- Classification: What type of article is it? Is it a measurement study, an analysis of a current system, or a description of a research prototype?

2- Context: Which articles are related? What theoretical principles were employed in the analysis of the presented issue?

3- Validity: Are the assumptions made by the authors valid?

This structured approach is designed to enhance the efficiency of reading research articles and to foster a deeper engagement with the literature.

4- Contribution to Science: Does the article contribute to the advancement of knowledge within the field?

5- Clarity: Is the article written with clarity and precision?

With this information, you will be equipped to make an informed decision regarding the continuation of your reading. Should the article fail to capture your interest, or if you find your background knowledge insufficient for comprehending the subject matter, it may be prudent to cease further examination.

Additionally, the authors may have made questionable assumptions that detract from the article's credibility. For articles that may not align with your immediate scope of inquiry yet could hold value in the future, completing Stage One will suffice. Moreover, when authoring your own articles, it is essential to consider that readers or reviewers are likely to conduct only a cursory examination of the content. Therefore, ensure that your section headings and subsections are relevant and cohesive, and compose precise and comprehensive abstracts. If a reviewer cannot swiftly grasp the essence of your article, there is a heightened risk of rejection. Likewise, if a reader cannot identify the main points within the first five minutes, they are unlikely to pursue further reading.

Stage Two

At this stage, you should engage with the article in a more focused manner, while omitting intricate details such as proofs. It is advisable to take notes on vital concepts and annotate the

text. Dominik Grasmann from the University of Augsburg suggests, “You may wish to record any unfamiliar terms or formulate questions to pose to the authors.”

1- Pay close attention to figures, graphs, and other illustrations within the article. Specifically, scrutinize the graphical representations: Are the axes appropriately labeled? Do the error bars effectively convey the reliability of the conclusions drawn? Deficiencies in these areas can differentiate a well-executed piece of research from one of inferior quality.

2- Mark any pertinent references that you have not yet explored for future examination; this practice can significantly enhance your understanding of the article's subject matter.

This stage should require approximately one hour. By the conclusion of this phase, you should be able to succinctly convey the article's main content and articulate its key points to another individual. This level of detail is suitable for articles of interest that may fall outside your primary area of expertise.

At times, despite completing Stage Two, comprehension may still pose challenges due to the novelty of the topic or the presence of unfamiliar terminology. The authors might have utilized experimental or proof methods that obscure critical components, or the text may lack clarity, be riddled with unsubstantiated claims, or exhibit excessive cross-referencing. Alternatively, fatigue may simply be hindering your focus due to the hour. At this juncture, you have several options: a) set the article aside, hoping the knowledge will not be essential for your work, b) revisit it after acquiring additional background knowledge on the topic, or c) persist and progress to Stage Three.

Stage Three

To achieve a comprehensive understanding of the article, particularly if you are serving as a reviewer, it is imperative to engage in Stage Three. The primary objective of this phase is to mentally reconstruct the article's arguments and assumptions, closely mirroring the authors' perspectives. This exercise will assist in identifying the article's innovations, assumptions, and potential deficiencies.

During this stage, you should concentrate on the article's details, critically evaluating the assumptions that underpin each claim while considering how you would articulate specific ideas if you were the author. Comparing your recreation with the original work will deepen your understanding of the methodologies and reasoning presented, thereby enriching your skill set further. Additionally, you may wish to jot down ideas for future research during this phase.

For novice readers, this stage may require approximately four to five hours, while experienced readers might complete it within about one hour. By the conclusion of this stage, you should be capable of reconstructing the article's structure from memory, identifying its strengths and weaknesses, and accurately referencing the assumptions, unaddressed citations, and any issues related to the analysis and experimental methods employed.

Timing Between Stages

Andrew Simpson from Queen Mary University of London emphasizes that "the most effective functioning of this process occurs when there is a relatively long interval between each stage." He elaborates, stating, "For instance, after initially gathering a substantial number of articles, I conduct a quick review of them within a ten-minute timeframe. It often takes several weeks before I engage with them for a second reading. Finally, after a few weeks or even months, I revisit them once more. It is only after undergoing these three stages that I attain a profound understanding of the articles that previously eluded me." I find this approach to be commendable, although I acknowledge that it may not be ideal for articles with imminent deadlines.

Literature Review

When undertaking a literature review, the skills honed through the reading of articles will be rigorously tested. You may find yourself navigating through numerous articles on unfamiliar topics. A pressing question emerges: which articles should you prioritize?

In the subsequent sections, I will delineate how to effectively apply the three-step reading method within the context of your literature review. First, employ a scholarly document search engine, such as Google Scholar or CiteSeerX, in conjunction with a meticulously chosen set of keywords, to identify three to five recent articles relevant to your field of study. Take a moment to review each article to grasp its central topic. Next, delve into the "Related Works" section of these articles; herein, you may uncover concise summaries of recent research. If fortune favors you, you may discover a recently published review article. Should this occur, consider your task accomplished. Nevertheless, be sure to read the review article thoroughly.

If no review article is identified during your search, the subsequent step is to pinpoint frequently cited foundational works and the names of prominent authors referenced. Such articles and authors are crucial within your research domain. Download these key articles and set them aside for subsequent review. Following this, explore the websites of these leading authors to ascertain the venues where they are presenting their research. This exploration will familiarize you with the most esteemed conferences in your field, as distinguished authors typically present their work at prestigious events.

The third step entails visiting the websites of these conferences and meticulously examining their recent publications. A cursory review can often reveal relevant, high-quality papers that will augment your literature review. The articles you gather, in conjunction with those previously set aside, will serve as the foundation for your initial draft. When reviewing these articles, proceed in two stages (notably, stages two and three). If you observe that several of the articles frequently reference a foundational piece that is absent from your collection, make it a priority to locate and read that article. Should this lead to additional gaps in your references, repeat the process as necessary.

Advantages

Over the past twenty-two years, I have successfully employed this method for reading conference proceedings, review articles, conducting literature reviews, and rapidly assessing articles prior to scientific meetings. This systematic approach facilitates avoidance of becoming mired in minutiae, allowing me to maintain a broader perspective on the literature. It enables me to estimate the time required for article reviews, and, based on my specific needs and available time, I can determine the appropriate depth of analysis necessary for each article.