

A study on foremost scientific writing books for graduate students and faculty members

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Abstract

Purpose - Several books on scientific writing and style guides have been published to enable new graduate students and early career researchers in thriving their careers by learning the art of articulating their work. This paper reports the reviews of 10 books on scientific writing and their transaction statistics from the main libraries of selected universities in Pakistan.

Design/Methodology/Approach– The books were purposefully selected having at least three reviews published by renowned publishers including the Institute of Electrical and Electronics Engineers (IEEE), Elsevier, SpringerLink, and Taylor & Francis. The circulation statistics of the last three years shared by chief librarians were used to find out the use of these books in university libraries.

Findings - Two books, ‘How to Write and Publish a Scientific Paper’ and ‘The Elements of Style’ drew the attention of most reviewers and journal editors. Seven universities have both books. Their frequency of issuance is significant in comparison to other books. The usage of “Style: Ten Lessons in Clarity and Grace” is significant, but very few university libraries possess this book.

Originality/Value - This selective bibliography of books may aid graduate students, faculty members, and professional engineers in perfecting their scientific writing skills and delineating their ideas fluently. This set of eloquent books is known for its readability and the

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distinguished role of providing rational guidance on successfully publishing the work for the intended readers.

Keywords - Academic writing, bibliography, scholarly publishing, scientific authorship, technical communication.

Introduction

What is the importance of good writing for a scientist? The detractor could mention Newton and Einstein as instances of how dissociable scientific worth and good authorship can be. A more modest slant would indicate that times have changed and that very few of us are Newtons and Einsteins. Researchers, from undergraduate students to professors, are being compelled to publish (Gasparyan, Ayzvazyan, Gorin, & Kitas, 2014). Having a paper rejected symbolizes a waste of precious time and effort, and good writing is now a factor that undeniably may decide between acceptance and rejection.

Nearly every engineer or scientist writes a technical paper, report, or document. Scientific writing is hard work and demands careful attention (Gopen & Swan, 1990). Therefore, a book designed to help potential writers is always welcome. So many research articles deserve to be better written than they are. These papers should be comprehensible and clearly written. Efficient communication through writing is a crucial expertise. Although most of us have been taught the fundamentals of sentence construction and grammar, the craft of writing and submitting research results correctly, clearly, and concisely is rare.

Engineering schools offer such course titles as technical writing, report writing, engineering writing, scientific writing, scientific English, engineering English and so on. Different types of technical documents are technical reports, feasibility studies, procedure manuals, proposals, brochures, webpages, letters, and memos etc. (Saint-Dizier, 2014). Technical writing is the kind of job-related writing that a professional does in his field; it should encompass writing skills important to the professional on the job.

In contrast to creative writing, technical writing deemphasizes the writer's role in the communication process. Stratton illustrated this idea as shown in Fig. 1 that instead of an act of self-expression, technical writing is an

act of communication (Stratton, 1979). Information is more important in it than the writer's opinion toward the subject.

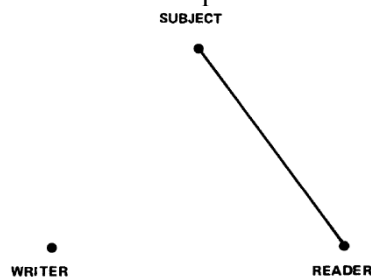


Fig. 1: In the communication triangle, the focus of technical writing is on reader and subject(Stratton, 1979).

Generally, new faculty members are loaded with teaching, research, and service duties. As a prerequisite of their jobs, these suggested college composition handbooks should be placed on a bookshelf near the writing desks of PhD students, teachers, and researchers. The following 10 books emphasize practical advice over abstract works on professional writing. Targeted at new grad students, this list is also helpful for professionals, supervisors, and mentors who are marshaling fresh workers. These researchers immensely benefited from reading these books and feel that they will provide our young peers with the tools to substantially improve their write-ups. Therefore, the researchers admire their precision and accuracy, recommend their utilization to both students and faculty, suggest their exercises to individuals and classes.

Objectives of the study

1. To review selected books on scientific writing for engineering students and faculty members.
2. To report the availability and transaction statistics of the reviewed books in university libraries in Pakistan.

Problem Statement

Graduate students and researchers often face difficulty in producing quality research due to poor skills in academic writing. Therefore, it is useful to recommend suitable books that can help them understand the art of academic writing for communicating effectively to intended readers. Although a lot of literature is available on scientific writing, it is challenging for researchers to know which books are

more beneficial for enhancing their scientific writing skills and for understanding the concepts. Therefore, this study aims to provide more suitable books on scientific writing and style guides to help graduate students and faculty members enhance their writing skills and produce quality research.

Significance of the Study

According to the authors' knowledge, this is the first study that reports reviews of suitable books on academic writing and style guides on a single platform to help students enhance their scientific writing skills. No literature on this subject has been found in the past. This study aims at opening the doors for researchers to select suitable books for enhancing their skills in producing quality research and better communication. Researchers are often busy with various assignments and lack time to produce quality written work; hence, relevant literature should be provided for them to save their valuable time and help them learn better.

This study provides a way to review and recommend suitable books for learning research skills, such as identifying problems and their statements, writing literature reviews, defining research methodology, data analysis, etc., so that researchers can learn better in a limited time for better research outcomes. Moreover, the availability of these books in libraries would be an added advantage for researchers to access them easily. This study can also help libraries develop their collections by acquiring and making recommended books available for researchers.

Methodology

Initially, the authors compiled a list of 44 books (Appendix A) on scientific writing and finally after thorough review, 10 books were purposefully selected based on the following criteria:

- Those books were included in which major academic publishers, such as the Institute of Electrical and Electronics Engineers (IEEE), Elsevier, SpringerLink, and Taylor & Francis published reviews.
- Those books were selected on which at least three reviews were found.

Major search engines such as Google, Yahoo, Ask.com, and Bing were used to compile the bibliography. The authors made a conscious effort to include book reviews published in high-reputed journals. Additionally, during the COVID-19 pandemic, the selected bibliography was sent to the chief librarians of 20 HEC-recognized universities via email ("HEC Recognized Universities and Degree Awarding Institutions," 2020). The email addresses were obtained from browsing their library websites. The librarians were requested to share the circulation statistics/frequency of issue of these titles during the last three years. Fourteen (14) chief librarians responded to the survey and shared the data, resulting in a response rate of 70%.

Reviews of Selected Books

Sir Ernest Gowers. *Plain Words*. Penguin. 2015. pp. 289

Since 1948, this entertaining style guide is in print. The Nobel Laureate, Sir Winston Churchill approved it. For improving the letters that officials write to the public, a distinguished British civil servant Sir Ernest Gowers wrote this slender book. He is also well-known for his revision of Fowler's classic *Modern English Usage*. He attempted to help his colleagues get rid of the awkward inflated language, also known as *federalese*, *officialese*, or *gobbledygook* in which government letters and reports are too often written. He applied the rigorous principles of Fowler's to written communication (Fisher, 1948). In the prologue, Sir Ernest Gowers gives advice as, "*Whatever the purpose, the object of the writer will be the same; to make the reader take his meaning readily and precisely.*" Certainly, this is the very beginning of wisdom in writing. The emphasis is heavily upon writing clear and simple English, and lesson the subtleties of word usage and grammatical conventions (Eaborn, 1987). However, Sir Ernest does not advocate rules for the sake of rules; he frequently identified that a government document should express its meaning as directly and simply (McDavid Jr, 1950). The authors recommend this book to every teacher and every student of composition.

William Strunk Jr. and E. B. White. The Elements of Style. Longman. 1999.pp. 105

Professor William Strunk published a book of rules for usage, style, and composition---the Elements of Style for use by his students at Cornell University in 1918. The students nicknamed this short textbook "*the little book*". This small volume consists of 11 elementary rules of usage, 11 basic principles of composition, a few matters of form, and some words and expressions commonly misused. The celebrated essayist and novelist E.B. White, a student of William Strunk at Cornell, revised this classic book and added the final chapter on style. Elwyn B. White, a star of the New Yorker in its golden days, authored Children's novels Stuart Little and Charlotte's Web among other works (Spaeth, 1979). In tribute to his teacher, White wrote, "*Style takes its final shape more from attitudes of mind than from principles of composition.*"

The Elements of Style is extensively used, remembered, and treasured. Professional authors stack it on their desks, editors consult it, and people with reverence for the language approve it (Spaeth, 1979). Many Americans venerate it and carry it around with them. In 2009, an admirer published a book about its history (Garvey, 2009). It is perhaps the most excellent optional reading reference in courses on English composition. It appears in bibliographies for courses in the arts and sciences and is the book most often suggested for professionals in any discipline (Baum, 1976).

The author is quite dogmatic in his approach. He presents, "*the principal requirements of plain English style*" with brevity, consistency, and conviction: "A writer who has written a series of loose sentences should recast enough of them to remove the monotony, replacing them with simple sentences,..." No jargon, no academic cloak; just direct and simple advice from an expert who admired "*the clear, the brief, the bold*" (Baum, 1976). Two of his rules are of great importance: Use the active voice and omit needless words.

This book can be recommended to professionals who like conviction in matters of usage and style and are ready to admit the decisions of Strunk and White on many matters open to some disagreement (Pullum, 2010). Nevertheless, most of the material is sound commonsense (Ashworth, 1961). When we send our

students out of university, we should send with this outstanding, everlasting, and handy book. In E. B. White's terms, a book that is still "*standing, in a drafty time, erect, resolute, and assured (Spaeth, 1979)*". If you are looking for more modern books on word usage, style and composition then please consult these books.

Barbara Gastel and Robert A. Day. *How to Write and Publish a Scientific Paper*. 2016, pp. 326

Professor Robert A. Day published the first edition of this book in 1979. This book right from the beginning helps to understand the basics of writing a scientific paper such as from the title of the paper to how to deal with the editor. It reports that better presentation of data, tables and illustrations is equally useful for acceptance of a scientific paper. Therefore, this book is a good source for researchers who need help in this context and an important document to enhance one's writing skills. Moreover, this comprehensive guide has many aspects of scientific stewardship and authorship (Peng et al., 2016). All imaginable steps have been included instead of describing it in detail. The first half of the book includes general concepts of scientific writing, publishing, and selecting journals for publication, from choosing the title to managing the final proof. The second part is devoted to scientific presentation. A variety of scientific stewardships such as oral presentations, reviewed papers, posters, grant proposals, and thesis writing are reviewed. The publication and peer review processes are also described. The content following practical approach provides frequently misused phrases and their appropriate alternatives (Baden, 1983; Horner, 2013). The suggestions provided in the books will help researchers to avoid using jargon phrases.

Margaret Cargill and Patrick O'Connor. *Writing scientific research articles: Strategy and Steps*. Wiley-Blackwell. 2013. pp. 236

This book on academic writing is meant for course use. Instructors will find this a useful resource for educating students. Its focus is on publishing journal articles in impact-factor peer-reviewed journals (Jobling, 2010). It is valuable for those engineers and scientists who are beginning a career in scientific research. The authors have

adopted a learning-by-doing approach; almost each chapter comprises sound exercises planned to facilitate readers to polish their authorship skills and enhance their chances of getting scientific work published in international journals. The book has a reasonable step-by-step structure; it offers the procedure of scientific writing as a series of convenient steps and satisfies the expectations of the book's title (Reschke-Hernández, 2014).

It has brief chapters, plainly labeled subheadings, and bulleted lists of vital points. Besides writing a scientific article, it focuses on the evaluation of the research article from a referee's or journal editor's perspective, a frequently neglected feature of how-to books on this subject. Thorough deliberation is given to main sections of a research article like results, methods, introduction, discussion, and abstract (Crissman, 2009). The results section as a 'story' is the most useful idea for new authors.

The chapter on the discussion section emphasizes word choices to '*negotiate the strength of claims*' Native English speakers and experienced authors may discern the shades of words like appear, indicate, and suggest, but it is tough for new writers and individuals with English as an additional language (EAL). Moreover, the writers explain computerized linguistic analyses called concordance (Cobb, 1997) as a tool for developing "*discipline-specific English*" (Crissman, 2009).

This book also underlines the primary tenet of scientific writing, "*Who is your audience?*". The book starts with this question and finishes by prompting readers that "*the goal is to keep your focus firmly on the audience for the document.*" The writers point out that our first audience is the editors and reviewers; if we fail in approaching them, our subsequent audience of readers will never materialize (Montine, 2013; Sengül, 2015). The textbook is intended for native and non-native English speakers. It can be used as a resource to perfect certain sections of a scientific paper and function as a desktop reference while organizing a paper submission (Reschke-Hernández, 2014). The authors suggest this book to individuals who want to perfect their academic writing skills.

Michael Alley. *The Craft of Scientific Writing*. Springer-Verlag. 1996. 3rdedition. pp. 282

The craft of writing, with its attention to audience and purpose, is the focus of a tome by Michael Alley, who is also famous for his assertion-evidence approach to presentations. The intent of this book is threefold: it dispels widespread misconceptions about scientific writing, it compares concrete examples of strong and weak writing, and it discusses the style of good writing. This book gives a thorough and dynamic presentation of almost any issue of scientific writing, enriched by various examples from different fields and famous scientists including Bohr, Einstein, and Feynman. Indeed it offers advice and valuable suggestions for both students and professionals, particularly those whose native language is not English (Vojta, 1997).

In Alley's words, "*Scientific writing is a craft*". The author aims to aid scientific writers in the craft of accurate and strong scholarly communication (McGuckin, 1989). The writing techniques include sentence construction, vocabulary use, making sense in what you write, and most features of macro-organization. But writing is also a craft which requires one to gauge the serviceability of one's content for a specific objective and shape what one has to say to fulfill the needs of a specific audience (Lackstrom, 1991).

Rather than a thorough treatment of English for Science and Technology (EST), it is a book for in-service professionals looking for an easy-to-read manual of writing. It provides basic and informal guidance. Alley talks rhetorically with his audience and cautions them about the advantages of forthrightness, clarity, image, and precision (Lackstrom, 1991). The text includes abundant supporting examples and illustrations. Scientific writers, engineers, teachers, and administrators concerned with similar purposes should find this book an indispensable asset (McGuckin, 1989). It is a fascinating book to read and also serves as a desktop reference.

Richard A. Lanham. *Revising Prose*. Pearson. 2006. 5thedition. pp. 176

A champion of the Plain English movement, Professor Emeritus at the University of California, Richard Lanham offers us his book 'Revising Prose'. Instead of

focusing on initial drafts, Lanham concentrates on revision. He endeavors to teach writers, instructors, students, and professionals to trim the “*Official Style*” into something controllable and understandable (Potsus, 2001). He explains, “*The Official Style, then, builds its sentences on a form of the verb ‘to be’ plus strings of prepositional phrases fore and aft; it buries the action of its verbs in nominative constructions with the passive voice; it often separates the natural subject from the natural verb, actor from action, by big chunks of verbal sludge; it cherishes the long windup and the slo-mo opening. Add all these attributes together and you have a sentence that has no natural shape to express its meaning.*”

This is an information age, and we are drowning in information. Information overload is an upshot of Information Age (Bawden & Robinson, 2009; Castells, 1997). New graduate students and professionals are bombarded with advice and information from all corners. Sometimes one thinks that engineering schools are failing to offer all one needs to know and operate in the industry (Landry, 2005; D. Lee, 2003). Human attention has become a vital commodity. When we squander words, we are wasting the major meager resource—attention. By adding lard, the Official Stylist wrecks the reader’s attention. We cannot tolerate the massive overhead of attention required to decipher such cryptographic language. Combined with the given exercises, Lanham's Paramedic Method will help us in grasping the Official Style. This book is an extraordinary bargain and should be in the custody of all those who have to write in the course of their occupation.

John M. Swales. Christine B. Feak. *Academic Writing for Graduate Students: Essential Tasks and Skills*. University of Michigan Press ELT. 2012. 3rd edition. pp. 432

This is a textbook intended to help graduate students who are not native speakers of English. John Swales is a linguist famous for his work on genre analysis. It is an excellent text especially for PhD students. The book reflects the authors' huge experience working with such students and is meticulous and accurate in its description of academic English. The text steadily introduces students to different models of writing, using extensive exemplars and numerous exercises to enhance the student's familiarity and

comfort with academic writing (A., 1996). Examples comprise work in many subjects so that students from different fields will find something related to their work.

The book accurately describes the features of graduate level English written discourse, and it thrives as a language course book. This book thrives on accuracy, erudition, and detail of the genre analysis that reinforces its accounts of the genres particular to researchers (Rouzer, 2007). The volume is a valuable resource for any writer, irrespective of mother tongue background, who wants to position themselves within a specific discourse community. The authors offer significant viewpoints on and useful advice for this process.

Eric Lighthouse. *Scientific Writing for Impact Factor Journals*. Nova Science. 2013. pp. 87

Supported by excellent illustrations and tables, it is a practical, concise, and step-by-step manual in the field of scientific writing. This short book consists of only 87 pages with a simple structure; foreword, preface, acknowledgments, two chapters ('General advice' and 'Tips by section'), a series of appendices and a regular index. Chapter 1 provides wide-ranging words of advice and the second chapter re-examines important parts of a scientific article's framework; title, abstract, introduction, methods, results, and discussion (IMRAD), conclusion and bibliographic references. Both new and old scientific researchers can benefit from this (Alriyami & Polychronakos, 2015; Winfield, 2014). It is equally valuable for new researchers who are grappling with the challenging first manuscript as well as for experienced writers who think that they know it all.

Bjorn Gustavii. *How to Write and Illustrate a Scientific Paper*. Cambridge University Press. 2008. 2nd edition. pp. 180

This compact text is user-friendly and comprehensive. Since the article style for each journal differs, excellent advice to new writers is to read articles identical to the one you plan to write, especially published in the journal you desire to publish your work. Lastly, one should remember that original ideas may necessitate imaginative writing (Vinicius, 2004). In addition, Bjorn

Gustavii cautions to solicit the help of a native English speaker as, "*native-English speaking researchers do not necessarily write good English-just as not all Swedish researchers are good at Swedish*" (Trueb, 2008). This book should be a delightful addition to the shelf of any scientist who directs learners in the travails of scholarly writing and reviewing.

Joseph M. Williams and Joseph Bizup. *Style: Ten Lessons in Clarity and Grace*. Pearson. 2016. 12th edition. pp. 256

In 1981, Professor Joseph M. Williams of the University of Chicago wrote this excellent guide to style. He articulates, "*it is good to write clearly, and anyone can.*" Everybody concerned with good writing can benefit from it, especially professionals who teach others how to write. The lessons are presented in a lucid, ordered, and coherent approach that directs readers' attention to stylistic matters. He offers prescriptions that work. Yet the advice given does not box the reader in: it advances the creative use of language (Gieselman, 1982). Successful writers stretch the majority of the rules. The author terms such canons as "non-rules" accompanied by excerpts from expert writers to show that they are really non-rules (Gieselman, 1982; Rivers, 1983). Every lesson is abundantly illustrated by examples and exercises which are aimed to illustrate the process of revision.

In the preface, Professor Williams says that this tome focuses on "*the single most serious problem that mature writers face: a wordy, tangled, too-complex prose style.*" He copes with that challenge excellently (Rivers, 1983). The author argues that to write well we "*have to be able to look at a sentence and understand how it works....*"; this entails that we should be explicit and certain and use a familiar vocabulary. He avoids the empty generalities: be clear, be concise that so many style guides offer (Gieselman, 1982). The book has valuable material on sources of verbosity and suggests prudent ways of teaching brevity. Readers of this volume must be internally motivated and keen on honing their skillets using language (Rivers, 1983). The advice and exemplars are diverse and stylish enough to make it a beneficial resource

for any seasoned author whose prose is clear, concise, and correct. We heartily recommend this book.

Results and Discussion

Table 1 presents the number of available book reviews for each title. It is evident from the data that the two books, '*How to Write and Publish a Scientific Paper*' and '*The Elements of Style*' drew the attention of most reviewers and journals' editors.

Table 1: Number of available book reviews

Sr. #	Book Title	Book reviews available
1.	Plain Words	5
2.	The Elements of Style	11
3.	How to Write and Publish a Scientific Paper	50
4.	Writing scientific research articles: Strategy and Steps	7
5.	The Craft of Scientific Writing	7
6.	Revising Prose	3
7.	Academic Writing for Graduate Students Essential Tasks and Skills	5
8.	Scientific Writing for Impact Factor Journals	3
9.	How to Write and Illustrate a Scientific Paper	5
10.	Style: Ten Lessons in Clarity and Grace	3

Table 2 shares statistics about the availability of these books in the main libraries of different national universities and their circulation statistics during the last three years. It is interesting to know that seven universities have both these books: '*How to Write and Publish a Scientific Paper*' and '*The Elements of Style*' and their frequency of issuance is significant in comparison to other books. The usage of "Style: Ten Lessons in Clarity and Grace" is significant but very few university libraries possess this book.

Table 2: Statistics about availability of books in different universities and usage.

Sr. No.	Title of the book	Number of universities having the book	Transactions of the book in last three years
1.	Plain Words	2	8
2.	The Elements of Style	7	203
3.	How to Write and Publish a Scientific Paper	7	51
4.	Writing scientific research articles: Strategy and Steps	2	1
5.	The Craft of Scientific Writing	3	22
6.	Revising Prose	3	41
7.	Academic Writing for Graduate Students Essential Tasks and Skills	2	49
8.	Scientific Writing for Impact Factor Journals	1	0
9.	How to Write and Illustrate a Scientific Paper	1	3
10.	Style: Ten Lessons in Clarity and Grace	3	146

Famous English philosopher and statesman, Francis Bacon very rightly said, “*Some books are to be tasted, others to be swallowed, and some few to be chewed and digested...and some few to be read wholly, and with diligence and attention*(Bacon, 2012).” Each book is unique. But some books are better than others. It was a difficult task to select 10 out of 44 books.

A lot of literature exists in the domain of academic writing. These 10 references focus on time-tested materials especially devised to enhance the writing skills of

beginners. This bibliography is a manual for developing a collection aimed at helping fresh graduate students, faculty members, and professionals considering a job in an academic institution or industry. In addition to the suggested books, the researchers from social sciences, physical sciences and humanities should consult following valuable and reliable discipline-specific style guides according to their needs.

- Kmiec, D. and Longo, B. (2017). *The IEEE Guide to Writing in the Engineering and Technical Fields*. John Wiley & Sons.
- Gibaldi, J. (2009). *MLA handbook for Writers of Research Papers*. Modern Language Association of America.
- American Psychological Association (2009). *Manual of the American Psychological Association*. American Psychological Association.
- University of Chicago (2017). *The Chicago Manual of Style* (17th Ed.). The University of Chicago Press.
- Turabian, K.L. (2018). *A Manual for Writers of Research Papers, Theses, and Dissertations: Chicago Style for Students and Researchers* (9th Ed.)The University of Chicago Press.
- Matthews, J.R. &Matthews, R.W. (2014). *Successful Scientific Writing: A Step-by-Step Guide for the Biological and Medical Sciences* (4th Ed.). Cambridge University Press
- Peat, J., Elliott, E. Baur, L., &Keena, V. (2002). *Scientific Writing: Easy When You Know How*. BMJ Books.

This notion effectively in the preface of their book that “...the writing experiences of most engineering students in college do not prepare them to write as they must in industry and government. They may have learned to write as students in the classroom, but they have not learned how to write as professionals employed in complex organizations...” (Mathes & Stevenson, 1976)

Professor Webster Britton presents major approaches to defining technical writing as subject matter, linguistics, thought process, and purpose (Britton, 1965). He further proposes, “...*the primary, though certainly not the sole, characteristic of technical and scientific writing lies in the*

effort of the author to convey one meaning and only one meaning in what he says. That one meaning must be sharp, clear, precise..." Likewise, B. C. Brookes suggests that the teacher's theme must be: *"If your paper is not plain and logical to me, then it is not good science (Brookes, 1964)."*

In recent times, experts have provided guidelines about word limits for different parts of a scientific paper. APA recommends that the title of a scientific paper should not be more than 12 words in length (C. Lee, 2010) and Bem also considers the ideal length for a title to be from 10 to 12 words (Bem, 1987). Similarly, the preferable word limit for the abstract section is 250 (Bajwa & Sawhney, 2016). The introduction does not have a set maximum word count like the abstract but it should be restricted to 10 to 15 percent of the total word count of the paper (Cals & Kotz, 2013). Such guidelines are very helpful to new engineering students and fresh faculty members.

Conclusion

Writing is hard, but it matters. Scientific writing is an essential skill required by all researchers for conveying ideas and knowledge clearly and effectively. Evolution from an undergraduate student to a graduate student can be a thrilling and demanding period in an educational career. Fresh PhD students must balance research demands and service obligations. This study presents that the two books; *'How to Write and Publish a Scientific Paper'* and *'The Elements of Style'* have got the maximum reviews as well as their usage by bibliophiles also highlights their importance. Several style guides and writing manuals provide information on writing scientific papers, reports, and theses. The recommended 10 books are valuable addition to the literature covering scientific writing. Moreover, six books have also been suggested for the researchers of social sciences, physical sciences, and humanities. They are aimed at equipping researchers with the tools to publish well documented, lucid, and convincing narratives that adequately highlight the intended gist of their work that ultimately led them to successfully publish their research for the intended readers.

Acknowledgment

The authors are grateful to the chief librarians of the universities and Degree Awarding Institutions: Lahore University of Management Sciences(LUMS),Government College University (GCU) Lahore, University of Gujrat (UOG), National University of Sciences and Technology (NUST),University of Education (UE), Lahore, University of Engineering & Technology (UET) Lahore, University of Central Punjab (UCP), University of Management and Technology (UMT), Punjab University (PU), Namal Institute Mianwali, University of Lahore, Aga Khan University, University of Engineering & Technology (UET) Taxila, and National University of Technology (NUTECH). They responded to our request during the current COVID-19 pandemic.

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