Remote Collaborative Writing: A Guide to Writing Within a Virtual Community of Practice

Yusuf Yilmaz, PhD, MSc
Michael Gottlieb, MD
Mary Rose Calderone Haas, MD, MHPE
Brent Thoma, MD, MA, MSc
Teresa M. Chan, MD, FRCPC, MHPE

Academic writing continuously evolves. Historically, major shifts in academic writing occurred with the advent of the typewriter, the personal computer, and the internet. Cloud-based technologies have once again changed the way that we collaborate on academic writing. In particular, the widespread availability of cloud-based word processors (eg, Google Docs, Word on Microsoft 365) and reference managers (eg, Zotero, Mendeley) have given researchers more ways than ever to engage efficiently and effectively. Residents and fellows may be well-versed with these technologies; however, using them for academically productive purposes may not be familiar to them.

The ideal use of these technologies is rarely described in the medical education literature. As a result, residents, fellows, and the rest of their research team (eg, supervisors) often differ dramatically in their approaches to collaborative writing. A shared mental model for the writing process may stimulate and streamline teamwork among authors. Within this article, we describe technologies and techniques that facilitate collaborative academic writing, how they can be leveraged effectively, and how their pitfalls can be avoided.

Why Should We Write Collaboratively?

Traditionally, authors conceptualize the act of writing as an isolating endeavor. Admittedly, famous authors have romanticized the task of writing as a lonely, singular feat: Virginia Woolf wrote about having a ". . .room of one's own" to be able to write.[1] However, there are multiple documented benefits to collaborating on academic writing. For example, the sum of the collective insights and intellect of a team exceeds that of its individual members,[2,3] and author teams generate more comprehensive supporting citations than individuals working alone.[4] In this paper, we propose a new model of academic writing that utilizes cloud-based technology to facilitate collaborative writing. Benefits of approaching writing in this way include support for writing in parallel while eliminating version conflicts, tracking and encouraging contributions, and supporting mentorship in writing style and technique.

Cloud-based documents may promote multiple authors to continuously update a draft in real-time. This facilitates shared work that can reflect several individuals' cognitive perspectives by supporting writing in parallel as opposed to in series. This allows for a more equitable writing experience with sustained engagement throughout the process by all members of the authorship team.

Tracking the contributions of individual authors within cloud-based documents also supports accountability for authorship contributions. The authorship principles set forth by the International Committee of Medical Journal Editors[5] require all members of the authorship team to make substantive writing or editorial contributions. This explicit tracking can support thorough, accurate conversations of authorship criteria and ensure that all authors make meaningful contributions. Further, receiving notifications regarding co-authors' edits and comments or seeing others simultaneously accessing the same document from miles away can create a sense of community and teamwork that transcends time and space. Collaborative writing also harnesses positive "peer pressure" that can fuel a team's momentum; push notifications of new additions can motivate co-authors to revisit a document out of fear of missing out on the latest developments.

Lastly, collaborative writing can enhance mentorship within teams of varying experience levels. The act of collaborative writing effectively generates a virtual community of practice around academic writing. As with other communities of practice, academic writing is a shared practice by which experienced members of this community can foster

DOI: http://dx.doi.org/10.4300/JGME-D-21-01108.1

Editor's Note: The online version of this article contains a detailed summary of tools and best practices.

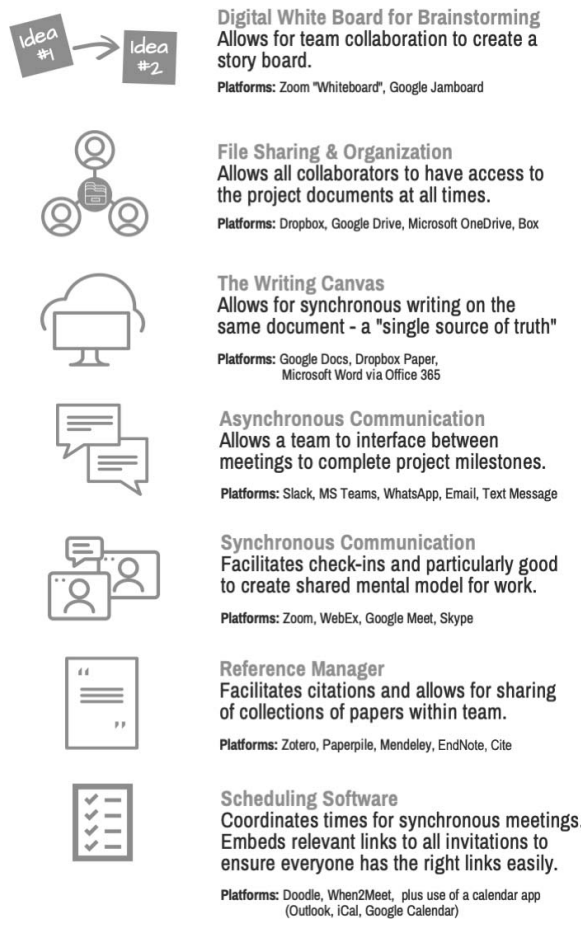

FIGURE
Infographic of Key Technology for Authorship Teams

novices (eg, peripherally legitimate) in forming professional identities and learning writing skills. Junior authors, who may otherwise feel intimidated by academic writing, have readily available opportunities to engage as peripherally legitimate members of a community of practice[6-9] and thereby increase their comfort and confidence with scholarly writing.

Strategies for Success

As with any community of practice, there must be a core group that can enable others to learn skills. In our model, team leaders must ensure their members' comfort with new technology and develop a shared mental model for the manuscript. Each author must have basic familiarity with the planned technology prior to beginning the work. Team leaders should provide training resources or links to existing resources to shorten the technology learning curve. In the early stages, team leaders may wish to check-in more frequently with members who are less familiar with the chosen platform. When writing, team leaders should clearly designate a main document that serves as the single source of truth throughout the writing process (including revisions). This will ensure that all authors work from the same information and avoid the challenges of identifying and combining changes that can occur when multiple versions of a document exist simultaneously. One approach to this would be to use a shared online word document (eg, Google Docs, Dropbox Paper, Microsoft 365).

Collaborative writing teams should begin with a brainstorming or storyboarding session that is best performed synchronously, either virtual via a web-conferencing platform (eg, Zoom, Skype) or an in-person meeting. One or a series of meetings may be needed to ensure group cohesiveness[10] and direction. The brainstorming component of the session(s) should allow all team members to have their ideas heard before consolidating them into a primary purpose and approach to the writing project. Storyboarding sessions can then be used to create a shared design and structure for the writing initiative that explicitly defines each author's role. When the team has a shared idea of the project and their roles, the team can then move to a more asynchronous approach by leveraging other communication tools (eg, Slack, Microsoft Teams, WhatsApp).[11] The FIGURE displays an infographic summarizing some key technology that authorship teams may wish to use, and the online supplementary data contains a more detailed summary of tools and best practices.

Collaborative Roles

The creation of writing teams should follow general best practices for teamwork with each individual having a clearly defined role that aligns with their interests and skill sets.[12] While individual authors may play more than one role on a team, the skill sets of the team members should complement each other (TABLE). Seeking out team members with both differing skill sets and diverse viewpoints can unlock a "diversity bonus" that arises when individuals with varying perspectives work in groups.[13]

At the beginning of the project, the team lead(s) should work to build consensus within the team on the sections and tasks for which they are each responsible. It may be advantageous to pair junior authors with more experienced authors to allow direct mentorship in a dyadic relationship. This promotes an apprenticeship role that is key to establishing a growing community of practice. Within a cloud-based collaborative writing team, it is important to be particularly clear on how the team will write together to ensure that everyone is on the same page and prevent misunderstandings down the line. Timelines should be set early, to balance building

TABLE
Collaborative Writing Team Roles and Responsibilities

Role[a]	Responsibilities
Team leader	▪ Assembles and coordinates team ▪ Creates documents and folders ▪ Sets goals and deadlines ▪ Sends reminder emails and performs individual check-ins with those who are behind ▪ Formats final manuscript for journal submission ▪ Submits the final manuscript ▪ Serves as the corresponding author often
Literature reviewer	▪ Performs focused literature searches on specific topics ▪ Assists with tracking and organizing references
Starter	▪ Drafts the first outline ▪ Writes the first draft with the understanding that it will likely undergo significant revisions ▪ Focuses on content and big picture, rather than phrasing
Finisher	▪ Clarifies concepts and edits existing work ▪ Works with team leader to ensure there is a consistent "voice"
"Red team"	▪ Provides editing skills ▪ Engages in initial discussions related to study design and/or data collection/analysis but may hold back to substantively edit later in the writing stage so to provide a fresh perspective to the draft; aims "to be cruel to be kind"; serves as an internal peer reviewer to anticipate and address gaps and thereby strengthen the submission
Content expert	▪ Has unique expertise in a certain aspect of the paper (eg, methodology or statistics) ▪ Drafts the sections specific to their area of content expertise ▪ Provides content expertise and/or suggests theoretical constructs
Graphic designer	▪ Has unique skills in visual design ▪ Creates visualizations of figures that facilitate understanding of the methodology and results

[a] It is important to remember that team members can have more than one role and also some roles be held by multiple individuals together. For instance, many times the "Team leader" will be the "Starter" and "Finisher" of the manuscript. "Content experts" for each individual area of the study may also be the most obvious person who will engage in the literature review in some circumstances. In other forms of scholarship such as a formal systematic review, several team members may wish to engage as the "Literature reviewer" simultaneously to ensure that a team gathers a comprehensive and highly relevant list of references.

momentum with external factors that could limit the availability of individual team members (eg, unanticipated life events). As team members may come from different traditions and cultures, clarity regarding how the writing will be edited is also important. It is helpful to explicitly acknowledge how suggestions and edits will be made, as these procedures vary among academic traditions, fields, and cultures. Collectively determining how this will work in your team will foster a psychologically safe writing environment that, ideally, allows all members of the team to contribute to the manuscript at a high level.

Pitfalls

Although digitally enhanced collaborative writing facilitates many aspects of scholarship, authors must bear several pitfalls in mind. First off, the utility of these tools can be limited by internet access, such as poor quality or restricted access. Though writing itself requires minimal bandwidth, firewall or security protocols at various institutions may prevent authors from accessing documents at certain times and/or from certain devices. While one can work offline, this may create conflicting copies that require edits to be merged manually, reducing the benefit of cloud-based collaboration.

Aside from the technology, writing collaboratively requires a change in the way authors both lead and follow. Collaborative writing teams necessitate different leadership strategies than papers where individuals serially contribute to the paper. Rather than writing a first draft, the first author often must devote energy to inspiring and keeping authors on task in order to overcome the group's collective writing inertia. Whereas with a paper that is primarily written by one person and then "handed off" to another for review and editing, collaborative writing often requires that individuals contribute to multiple phases of the writing, often simultaneously with one another. Without clear leadership and followership, group writing easily stalls due to diffusion of responsibility.

Finally, by enabling group editing, the role of co-authoring potentially becomes more active. Tracked changes and comments facilitate engagement in team writing, creating visible momentum for team members. Push notifications, from platforms such as Google Docs, readily allow co-authors to teach each

other through questions, which makes the writing process more engaging. Also, members of the team can resolve conflicts or issues asynchronously via margin comments. However, these processes can be more intrusive. Collaborators must have honest conversations about their own capacity to contribute, and the lead author may need to adjust timelines to achieve mutual consensus over a shared vision.

Conclusion

Online tools for working remotely offer an increasing number of features to enhance collaborative writing. Collaborative work can be helpful to scholars across the academic spectrum, from residents to senior scientists. As remote work becomes more common, integrating tools afforded by technology can increase productivity and develop writing skills through social interactions. This article describes various strategies and tools to facilitate the initial phase of group writing. Future work should elucidate collaborative techniques for other components, including submission, revision, and resubmission.

References

1. Woolf V. *A Room of One's Own*. London, UK: Hogarth Press; 1929.
2. Bennett LM, Gadlin H. Collaboration and team science: from theory to practice. *J Investig Med*. 2012;60(5):768-775. doi:10.2310/JIM.0b013e318250871d
3. Walker DHT, Davis PR, Stevenson A. Coping with uncertainty and ambiguity through team collaboration in infrastructure projects. *Int J Proj Manag*. 2017;35(2):180-190. doi:10.1016/j.ijproman.2016.11.001
4. Gamberi C, Hall K. Undergraduates can publish too! A case study of a scientific team writing assignment leading to publication. *Int J Sci Educ*. 2019;41(1):48-63. doi:10.1080/09500693.2018.1531439
5. International Committee of Medical Journal Editors. Defining the Role of Authors and Contributors. Accessed March 25, 2021. http://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html
6. Bourhis A, Dubé L, Jacob R. The success of virtual communities of practice: the leadership factor. *E J Knowl Manag*. 2015;3(1):23-34.
7. Dube L, Bourhis A, Jacob R. Towards a typology of virtual communities of practice. *Interdiscip J Inf Knowl Manag*. 2006;1:69-93. doi:10.28945/115
8. Dubé L, Bourhis A, Jacob R. The impact of structuring characteristics on the launching of virtual communities of practice. *J Organ Change Manag*. 2005;18(2):145-166. doi:10.1108/09534810510589570
9. Lave J, Wenger E. *Situated Learning: Legitimate Peripheral Participation*. Cambridge, UK: Cambridge University Press; 1991.
10. Tuckman BW. Developmental sequence in small groups. *Psychol Bull*. 1965;63(6):384-399. doi:10.1037/h0022100
11. Montrief T, Haas MRC, Alvarez A, Gottlieb M, Siegal D, Chan T. Thinking outside the inbox: use of Slack in clinical groups as a collaborative team communication platform. *AEM Educ Train*. 2021;5(1):121-129. doi:10.1002/aet2.10497
12. Landry A, Zhao J, Shappell E. Authorship anatomy: a guide for scholars. *BMJ*. 2020;371:m4702. doi:10.1136/bmj.m4702
13. Page SE. *The Diversity Bonus: How Great Teams Pay Off in the Knowledge Economy*. Princeton, NJ: Princeton University Press; 2017.

Yusuf Yilmaz, PhD, MSc, is Postdoctoral Fellow, McMaster Program for Education Research, Innovation, and Theory (MERIT), Hamilton, Ontario, Canada, and Researcher-Lecturer, Department of Medical Education, Faculty of Medicine, Ege University, Izmir, Turkey; **Michael Gottlieb, MD,** is Associate Professor, Department of Emergency Medicine, Rush University Medical Center; **Mary Rose Calderone Haas, MD, MHPE,** is Instructor and Assistant Residency Program Director, Department of Emergency Medicine, University of Michigan Medical School; **Brent Thoma, MD, MA, MSc,** is Associate Professor, Department of Emergency Medicine, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, and Clinician Educator, Royal College of Physicians and Surgeons of Canada, Ottawa, Ontario, Canada; and **Teresa M. Chan, MD, FRCPC, MHPE,** is Associate Professor, Department of Medicine, Division of Emergency Medicine and Division of Education & Innovation, Clinician Scientist, MERIT, and Associate Dean of Continuing Professional Development, Faculty of Health Sciences, McMaster University, Hamilton, Ontario, Canada.

Corresponding author: Teresa M. Chan, MD, FRCPC, MHPE, McMaster University, Hamilton, Ontario, Canada, teresa.chan@medportal.ca, Twitter @TChanMD