Teaching Academic Writing in the Health Sciences

A Guide for Instructors, Mentors, and Trainers

Ella August, PhD, MA, MS

Thanks to those who supported this book.

I am deeply indebted to all those who supported the development of this book, including the Center for International Reproductive Health Training at the University of Michigan for their valuable partnership and support. Two key advisors and supports were Cathy Fleischer and Yolanda Smith. Cathy, who has expertise in guiding teachers in pedagogical approaches and research, was my advisor for my master's work in Writing Studies and provided key guidance for this book. Yolanda is a medical doctor and health sciences researcher, and has been an invaluable mentor, providing incredibly insightful comments and helpful advice throughout the writing process. Other key individuals who provided feedback and advice include Belinda Needham, Andrew Brouwer, Abram Wagner, Frederique Laubepin, Molly Coeling, Sarah Zelner, and Cheryl Moyer. Further, I am deeply grateful to Merrill Hodnefield, Lise Anderson, and Bryan Alfaro who provided language editing, helped to identify sticking points, and made suggestions that helped sharpen my message. Many thanks to Ann Blakeslee who connected me with Bryan Alfaro. Additionally, Jeremy York provided guidance on presenting open-access and electronic resources. Thanks also to Anam M. Khan, Faelen Jacobson Davies, and Kirby Morris who contributed thoughts and insights for the book. Finally, I am grateful to my husband, Joe Eisenberg, who provided steadfast support throughout.

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Preface

As the culmination of the research process, publications are the centerpiece of our work, serving many critical roles. In addition to getting the word out about how to address devastating health problems, from Ebola outbreaks to perinatal depression to workplace violence worldwide,[1–4] they serve as the currency of success and promotion in academic and research settings.[5–8] Over time, publications have taken on even more significance as many graduate programs worldwide now require PhD students to publish their doctoral thesis.[6,9–11] Finally, beyond the benefits of supporting health and professional advancement, writing serves as a means to think through and process ideas, providing an avenue for researchers to critically reflect on their work and process.[5,12,13]

Despite the central role of publications in education and research, faculty, instructor, and mentor training on writing and publishing in the sciences is uneven.[14,15] While some may have taken a great class on communicating research findings to a professional readership and others may have had outstanding mentorship in this area, many have never received formal training in scientific writing. Teaching this topic can feel especially daunting when you consider that instructors, mentors, advisors, and those leading professional training activities commonly haven't themselves had formal instruction on writing, let alone training in teaching a class or mentoring graduate students.[16,17] Further, incorporating writing into large class sizes can be daunting; it's not unusual to evaluate 50 or more student papers in a health science course. Additionally, in graduate education, much of the writing instruction is done outside the classroom (advising and mentoring trainees, for example), which offers its own challenges. This

instruction outside the classroom is so time consuming and underappreciated that Natalie Stillman-Webb has referred to it as "invisible work."[6]

From the student and mentee perspective, learning to write and publish a scientific paper comes with different challenges. One is the limited time overburdened mentors may have to guide them.[18] This lack of available mentorship may be particularly acute in resource constrained settings, and students in such contexts frequently struggle to publish their thesis or dissertation work.[19,20] Though trainees need to learn technical writing skills, a central-- but often hidden-- challenge in graduate training is learning to navigate the academic context and developing a disciplinary identity.[3,6] For a trainee, this might mean learning to negotiate different types of feedback from various individuals,[21] learning to apply disciplinary knowledge to a new problem,[22] or appreciating what type of evidence is considered credible in supporting a claim within their discipline.[3] This difficulty is magnified for those from a different country, as these learners must navigate additional cultural complexities.[23,24] For example, a student might struggle to carve out their own scholarly identity when deference to authority may be the norm in their home country.[21,23]

Throughout this book, I also highlight particular challenges faced by other vulnerable groups, including neurodiverse writers,[25] those struggling with imposter phenomenon (sometimes called imposter syndrome),[26,27] as well as those with anxiety and perfectionism,[28,29] among others.

This book is meant to fill the need for guidance on how to teach, train, and mentor scientific writing and publishing to early-stage researchers in the health sciences. It is also meant to address the need for guidance on *writing* in the health sciences in settings

around the world.[17,30] I focus on three types of teaching and mentoring most common in the health sciences: classroom teaching, mentoring/advising, and leading training events such as publication workshops, for example, those in a low-income country setting. Throughout, I emphasize how to work with students with a range of backgrounds, strengths, and challenges and offer a range of approaches for readers to tailor to their own context. I also emphasize time-saving approaches for classroom instructors and one-on-one mentors. As I discuss in the Introduction, Part 2 provides instruction on how to write a scientific paper. This part is meant to support instructors who may not have had complete training in this area; it can also help guide health sciences trainees.

In terms of my own positionality, I work in a US school of public health, teaching writing classes in an Epidemiology Department and working globally to train professionals on writing and publication. My scholarship revolves around teaching writing in the health sciences and strengthening capacity for research in settings around the world. In recognition of limited budgets and resources, the book is open access and the resources suggested throughout are freely available. To this end, I do not spend a great deal of time discussing affordances such as writing centers that are not widely available across the world.[6,31,32]

Finally, a note about technology. When I started writing this book, ChatGPT had not been launched. I have incorporated references to and guidance on generative academic intelligence (genAI) throughout and have dedicated an entire chapter on developing policies around genAI for student writing assignments. This technology, however, is changing rapidly and it is inevitable that some of the advice and literature in the area will go out of date. To address this limitation, I focus on broader strategies and

approaches where possible to help instructors set policies and leverage new technologies as they arise.

Introduction

While the topic of this book is fairly narrow—teaching early-stage health sciences researchers how to write a scientific paper—the intended readership is somewhat broad. Part 1, which guides training and teaching students and mentees on how to write and publish their research, is aimed at four main groups: health sciences instructors, mentors, academic program leaders, and those who wish to strengthen capacity for academic writing in their setting.

Instructors include those who teach scientific writing or applied research courses (e.g., capstone research courses) and those who teach content-based (as opposed to writing-focused) classes in which students will complete a research-oriented writing assignment. Mentors include advisors of graduate students as well as mentors of fellows and even junior faculty. On a more programmatic level, the book is aimed at academic program directors and curriculum committees, who may find the discussion and resources useful for setting writing standards in their programs or departments. And, finally, the book will be a resource for those who wish to strengthen capacity for publishing research in their health ministry, university, fellowship program, or other organization, with an emphasis on low-resource settings. Although many of the examples I provide are oriented toward quantitative research, the book is not exclusively focused on quantitative research and will also be helpful to those engaged in qualitative research.

Part 2 represents a notable shift in content and intended readership. Whereas Part 1 guides the teaching and training of writing and publishing, Part 2 guides writing and publishing. It is intended for graduate students, post-doctoral research fellows, and even junior faculty who did not receive complete training in this area. Part 2 is also intended to

be used by instructors, mentors, and those working to strengthen research capacity in their settings as instructional material and to fill in gaps in their own training.

In this introduction, I describe the pedagogical movements, models, approaches, and perspectives reflected throughout the chapters; I then present a summary of the book's organization and content. After a brief note about terms, I offer a set of strategies for using the book depending on your professional orientation and needs.

The scholarship in this book is based on research from several areas and I highlight the most prominent among them here, drawing broad connections to teaching and mentoring practices and themes of the book. First, the book includes perspectives and research from the academic literacies and research literacies movements. The academic literacies movement asserts the technical aspects of writing, such as organization and mechanics, are most often not the major challenges that students and trainees face, and instead emphasizes the need to learn about the cultural and social contexts around how we communicate.[6] Research literacies is an overlapping perspective that shares the view that writing is—at its core—a social practice.[6] These movements point to the development of a scholarly identity as a key path to a new academic's success.[3,6] Thus, developing this identity requires researchers to engage with scholars from their new community, learning the way things are done and eventually deciding whether to conform to the community's norms or push boundaries to pioneer new ways of doing or thinking about things.[6]

Two ways in which mentors and advisors can guide their trainees' writing and publishing in step with these perspectives include: connecting them with scholarly communities and being explicit when guiding them on writing and publication practices.

First, exposing trainees to relevant social contexts will help them learn how to function and succeed in the academic environment. An example I point to in Chapter 1 is the importance of encouraging students to immerse themselves in communities of practice to gain experience and fluency with academic and research literacies.

Second, social practices in which writing is embedded tend to be implicit and can create challenges. For example, students will not appreciate unwritten rules about authorship or norms about how to communicate with coauthors until a mentor or advisor explains these things, and a major challenge for seasoned academics in guiding trainees is they have become so familiar with these types of implicit ways of doing and thinking about things that they often forget to point them out.[3,6,33] Thus, transparency about these practices is a core teaching approach that will help trainees succeed.[34] This is especially important given that students and trainees come from very diverse language, cultural, and educational backgrounds.[35]

A related theme is the important role of power dynamics in the development of a scholarly identity. First, power dynamics are at play as trainees gain agency and transition into their scholarly communities. They experience a tension between expressing their original ideas and deferring to their established community.[3,6] Another way in which power dynamics shape writing development is the diminished power trainees experience when their mentors or instructors are less transparent with respect to norms and conventions. For example, a student who does not understand strategies for choosing a target journal for their paper will be more beholden to their advisor, and less able to gain autonomy. Therefore, greater transparency offsets power imbalances between

an advisor or mentor and their trainee.[33,36,37] This theme is explored in greater detail in Chapter 11 on mentorship strategies.

In addition to areas described above, I also draw from the scholarly literature on second language writing as well as from the English for academic purposes movement, which focuses on training international students in Anglophone universities,[6] although the intended readership of this book is not exclusively or even primarily those in Anglophone countries. Finally, I incorporate effective pedagogical practices and insights from the writing across the curriculum movement, which supports writing in courses across a learning institution and encompasses writing to learn, writing to engage, and writing in the disciplines which focuses on conventions and writing styles of particular disciplinary areas.[38] Additional scholarship is drawn from technical communication, first-year writing, and the rhetoric of science.

Below, I provide an overview of the book's two parts, followed by suggested strategies for using the book for different types of readers based on their backgrounds and goals. The two parts, and the chapters within those parts, stand on their own so that you may focus on the parts or chapters that are relevant to you and read them in any order; for this reason, some key information may repeat across certain chapters.

Overview of the Book

Part 1 provides foundational principles and approaches to teaching and mentoring early-stage researchers in writing a scientific manuscript, framed by the perspectives and themes described above. This part covers many of the topics you would expect to see in a book on teaching scientific writing: Chapter 6 provides advice for writing instruction in the classroom or in a publication workshop; Chapters 7 and 9 describe recommendations

for creating effective writing assignments, and providing respectful and motivating feedback, respectively; and Chapter 11 guides mentor activities.

At the same time, there are also additional chapters on socializing your trainees into academic writing (Chapter 1), helping writers effectively reach their readers (Chapter 3), and advice on working with writers with varying levels of needs, backgrounds, and experiences, with particular emphasis on working with second language speakers, and neurodiverse writers (Chapter 5).

In the service of helping students gain entry into academic and disciplinary culture, the book guides instructors to ask students to write their research papers as if they will publish them in an academic journal, even if publication is not the goal. While this may seem like adding a layer of unnecessary work for the student and instructor, this approach helps students learn about how knowledge is created in science and how to evaluate publications more critically[39,40]. This part further touches on two other professional writing topics: collaborative writing (Chapter 10) and writing productivity (Chapter 12). Inclusion of these topics is intended to help make transparent professional practices and norms so new researchers have access to the strategies for carving their own paths to success. Finally, Part 1 offers instructors guidance on clarifying their values and goals for student writing-- in part to help them think through whether and how generative artificial intelligence technology such as ChatGPT might fit into the writing process (Chapter 8). Example activities, assignments, agendas, and curricula are provided throughout Part 1, along with related open-access resources and instruction planning activities at the end of each chapter. The sample assignments and activities are included with the expectation that instructors will modify them to fit their context and goals.

Part 2 offers a review of how to write a scientific paper. I include this section primarily for instructors, mentors, and advisors who have never been formally trained on scientific writing. This part will help instructors build a strong foundation for understanding the structure of and strategies for successful writing, as well as providing customizable teaching materials that can be used for instruction. It may also be useful to students and early-stage researchers as a guide on how to write a scientific paper.

Notably, the first two chapters of Part 2 (Chapters 13 and 14) are on crafting writing to get attention and reach your readers, and planning a paper, respectively. Chapter 13 helps writers understand and respond to their writing context by considering factors like their purpose, intended readers, and format, and how these might shape the writing and framing of the paper. This chapter also discusses crafting persuasive arguments. It emphasizes that, as scientists, we need to make arguments to justify our research, make claims supported by our data, and even make an implicit argument for our own credibility as scientists and authors.

Chapter 14 is a guide to building a successful author team and choosing the right target journal. The early part of the chapter offers advice on building an author team and organizing and coordinating the many activities required to produce a high-quality publication. The latter part of the chapter provides guidance on choosing the right target journal, setting researchers up to write to their target readership.

Chapters 15-22 provide a "how to" for writing each section of a paper, starting with crafting the introduction and ending with writing a compelling title. Each short chapter offers guidance on the structural elements of academic journal articles with examples, tips, and helpful resources for developing each part of a paper. Finally,

Chapter 23 offers advice and examples guiding author teams to effectively respond to peer reviewer comments.

A Note on Terms

Throughout the book, I use the term "mentors" to refer to those who teach and train students and other trainees outside the classroom-- individually or in groups (e.g., labs or research groups), including advisors who guide students on research in an academic program. "Instructors" are those who teach students in a classroom (or virtually). "Workshop leaders" are those who teach writing and publication workshops. For simplicity, I refer to "instructors and mentors" to collectively refer to instructors, mentors, and workshop leaders unless there is a specific discussion that relates only to one or two of these groups. "Mentees" refers to those guided by mentors, and I refer to "students" mostly when discussing pedagogical approaches specific to the classroom. For efficiency, I use "trainees" to encompass both students and mentees who are trained and taught within and outside the classroom. "Early-stage researchers" includes those who are not necessarily in a formal course, workshop, or mentorship program, but are in need of or receiving guidance on scientific writing.

A Note About Resources

A limited number of resources for further reading are listed at the end of some chapters. To avoid broken links and outdated web pages, I have included complete information for open-access articles with the full DOI address; these links will remain permanent. Two additional types of resources can be very helpful for your specific needs. The first is writing center websites, for example, The University of Michigan Sweetland Center for Writing or the Purdue University Purdue Owl. Writing centers such as these

have a wealth of resources for everything from giving writing feedback to creating rubrics to setting policies around generative AI for your writing assignments. Finally, Open Educational Resources ("OER") are free, open-access materials for teaching, learning, and research. These materials can be retained, reused, revised, remixed, and redistributed. A searchable database of such resources can be found at: https://oercommons.org/. In some cases I list the names of organizations or websites without a URL with the assumption that current URLs can be identified by searching online.

Strategies for Using This Book

Here, I offer a summary of what I consider essential chapters for four specific types of readers: (1) instructors who are teaching a writing or research course, or those interested in developing writing standards for their academic program; (2) mentors working individually with mentees (or with small labs or research groups); (3) instructors who assign writing in their health sciences courses; and (4) leaders or staff who wish to bolster capacity for publishing research in their organization.

1. Instructors who teach writing classes and those with programmatic interests:

If you are developing an applied research course (such as a capstone course) or a scientific writing course, or you are interested in enhancing your graduate program curriculum with suggested writing standards, I suggest reading the entire book.

2. Mentors:

The chapters listed below are key resources for mentors who work with trainees, either individually or in groups. These chapters will help mentors support mentees in

deepening their understanding of disciplinary and academic literacies as well as developing their writing and publication savvy to move their projects forward.

- Chapter 1. Socializing Your Trainees into Academic Writing
- Chapter 2. Helping Writers Create Meaning with Stronger Reading and Source Use Skills
- Chapter 3. Encouraging Writers to Reach Their Readers Using Rhetoric
- Chapter 4. Supporting Diverse Needs, Backgrounds, and Experiences with Your Writing Instruction
- Chapter 5. Honoring the Writing Process: Staging Assignments and Supporting Writing to Maximize Impact and Manage the Workload
- Chapter 8. Considering the Role of Technology in Assigned Writing
- Chapter 9. Engaging Students With Feedback that Promotes Agency and Development
- Chapter 10. Strategies for Making Student and Professional Collaborative Writing a Success
- Chapter 11. Mentoring Trainees to Develop and Publish Their Research
- Chapter 12. Helping Struggling Writers Overcome Challenges Through Productivity Strategies, Retreats, and Support Groups
- Part 2. Individual chapters can be assigned to trainees as readings and the topic-specific chapters can stand alone for instructors and mentors in response to specific needs.

3. Instructors who assign writing in their health sciences courses:

If you teach a content class and assign writing, adding more instruction and complexity to support writing may seem like a daunting task. However, the below material will allow you to leverage writing to help students engage more deeply with course content, develop effective arguments, and learn how to communicate about the course material. Front-loading this kind of instruction (scaffolding) will have reverberating impacts on student performance in the current class (making the instructor's job "easier") and beyond.

- Chapter 1. Socializing Your Trainees into Academic Writing
- Chapter 2. Helping Writers Create Meaning with Stronger Reading and Source Use Skills
- Chapter 3. Encouraging Writers to Reach Their Readers Using Rhetoric
- Chapter 4. Supporting Diverse Needs, Backgrounds, and Experiences with Your Writing Instruction
- Chapter 5. Honoring the Writing Process: Staging Assignments and Supporting Writing to Maximize Impact and Manage the Workload
- Chapter 6. Planning a Class or Workshop on Scientific Writing
- Chapter 7. Creating Effective Writing Assignments for Health Science Courses
- Chapter 8. Considering the Role of Technology in Assigned Writing
- Chapter 9. Engaging Students With Feedback that Promotes Agency and Development
- Chapter 12. Helping Struggling Writers Overcome Challenges Through Productivity Strategies, Retreats, and Support Groups

- Part 2: Individual chapters can be assigned to trainees as readings and the topic-specific chapters can stand alone for instructors and mentors in response to specific needs.

4. Leaders or staff of an organization who wish to bolster publication capacity:

If you are part of a health ministry, a fellowship program, or other organization that would benefit from greater capacity to publish research, consider the following chapters.

- Chapter 2. Helping Writers Create Meaning with Stronger Reading and Source Use Skills
- Chapter 3. Encouraging Writers to Reach Their Readers Using Rhetoric
- Chapter 6. Planning a Class or Workshop on Scientific Writing
- Chapter 9. Engaging Students With Feedback that Promotes Agency and Development
- Chapter 10. Strategies for Making Student and Professional Collaborative Writing a Success
- Chapter 12. Helping Struggling Writers Overcome Challenges Through Productivity Strategies, Retreats, and Support Groups
- Part 2: Individual chapters can be assigned to trainees as readings and the topic-specific chapters can stand alone for instructors and mentors in response to specific needs.

Part 1: Teaching Scientific Writing

Chapter 1: Socializing Your Trainees Into Academic Writing

Academic English is said to have no native speakers.[6] Trainees entering an academic environment can feel like they are functioning in a different culture, much like a second-language learner.[3,6,41] Learning the academic ropes requires newcomers to learn navigation strategies and skills, as well as understanding a discipline deeply enough to start thinking, acting, and speaking as a disciplinary insider.[3,6,41–44] Learning these abilities are critical to successfully entering an academic community and, in the shorter term, completing an advanced degree, research project, or publication.[3,6]

Yet, mentors and instructors often experience "the curse of knowledge"[45]: their ways of thinking, doing, and navigating become so engrained that they may no longer be aware of them.[41,46] The challenge of recognizing and teaching these habitual thought processes and behaviors has led some to call them "hidden."[33,47] Reexamining and explicitly teaching hidden skills will help you socialize your trainees.

Making implicit knowledge explicit, however, is not enough. Good training requires the immersion of newcomers into an academic community to allow them to engage with disciplinary insiders, gradually embodying academic and disciplinary identities. This type of engagement has been called "legitimate peripheral participation,"[48] recognizing that newly-immersed trainees practicing their skills are still on the periphery. Legitimate peripheral participation is a key strategy to help trainees become full members in a given academic community.[3,49]

In this chapter, I will set the stage for the rest of the book by focusing on opportunities for learning academic and disciplinary practices. Academic literacies are

competencies that help newcomers successfully navigate an academic context. These are defined somewhat differently by different scholars, but relevant examples include professional norms, conventional strategies for managing the publication process, as well as skills supporting overall scholarship.[22] Disciplinary literacies overlap with academic literacies (some consider both types under the umbrella of "academic literacies") but relate more to discipline-specific ways of thinking and doing things. The culmination of learning these collective literacies is developing a scholarly, disciplinary identity.[3,6,22,44]

I start by describing the above concepts a bit more fully with examples that relate to writing and publication. I then offer key activities you can conduct as a mentor or instructor to help trainees develop these skills. Academic literacies are wide-ranging, including, for example, professional norms and conventions in negotiating the publication process. One example of a hidden norm in this realm is the "appropriate" amount of time to give a coauthor when asking for input on a draft publication. A newcomer might not realize that "by the end of the week" is too short a deadline—or they might not even realize they should give a deadline. Another example is a skill that supports publication: how to write an effective submission cover letter. This type of training is not commonly included in a graduate curriculum and examples are not widely available. A more complex hidden academic skill is how to create meaning from scholarly readings.[22] As I discuss in the next chapter, explicit reading instruction is typically not part of a graduate program curriculum, but reading demands are complex and evolving in such programs and trainees come with a range of experience in this area.

Becoming fluent in academic literacies also means newcomer must develop an appreciation for the formal and informal rules and values embedded in academic settings.

For example, newcomers may not realize that some *written* rules can be broken (in *some* circumstances, it is okay to go over the word limit when submitting a paper to an academic journal), whereas others should never be broken (do not submit your manuscript to two journals simultaneously).

A common thread in each of these examples is that a student or trainee engaging in professional activities with a group of insiders will likely encounter each. For example, if a student or trainee is required to publish their dissertation research, they must engage with coauthors and the publication process (putting them in the position of asking for feedback and writing a cover letter). Having explicit guidance from a mentor or instructor will help them be successful in navigating such activities.

Similarly, discipline-specific complexities will arise during student or trainee interactions with insiders when engaging in scholarly activities related to writing and publishing. For example, trainees will come across unfamiliar disciplinary vocabulary used to articulate the nuances and complexities of relevant research problems. Further, other key disciplinary ways of thinking and writing will arise such as acceptable types of evidence to support claims.[41] For example, although all health sciences researchers are concerned with causality, there is a *particular* emphasis in epidemiology on thinking about and articulating causality in a certain way. The field has developed a structured quantitative framework that provides a means to talk about causal inference, although many still rely on a more qualitative approach based on a set of criteria (i.e., the Bradford Hill criteria).[50] Regardless, precise language to describe associations is needed to avoid overstating causality in a publication. Disciplinary practices are also reflected in the types of scholarship that researchers publish. For example, outbreak investigations and research

methods articles are more specific to epidemiology, whereas case studies are more common in medicine.

Approaches to Socializing Trainees

Immersing trainees into an academic community is the key to socializing them into academic and disciplinary ways of thinking and doing things; this approach has been termed "situated learning" because it provides trainees with valuable context, real-world activities, and relationships from which to learn.[48] Four approaches to socializing trainees are highlighted throughout the rest of this chapter include welcoming trainees into communities of practice, serving as their "publication broker,"[51] guiding them with mentor texts, and using explicit feedback practices. Here, I introduce these strategies and provide some examples; throughout the rest of the book, I elaborate on these strategies in greater detail.

Encourage Trainees to Join a Community of Practice

Jean Lave and Etienne Wenger introduced the concept of "communities of practice[1]"[48,49,52] groups characterized by a shared interest, a community, and the practice of sharing resources and experiences.[49] In such communities, the emphasis is on learning. The underlying theory is that learning is social and, as Wenger claims, a community "forms the social fabric of learning."[53] In an academic setting, communities of practice can focus on a range of shared interests that help to socialize trainees into their academic and disciplinary communities. For example, they can be helpful in supporting those from a different country in academic discourse socialization,[54] supporting group members through the dissertation proposal process,[55] developing a scholarly identity during

[1] Each scholar points to the other as the person who introduced it.

doctoral studies,[56] promoting well-being and a newly developing research identity,[57,58] supporting doctoral studies,[59] and developing information literacy skills.[60]

While some such practice communities meet regularly, others mainly engage through programmatic or institutional connections[54] or take the form of a workshop series.[61] The groups can be peer or faculty led. At the same time, some scholars have explicitly recommended inclusion of a faculty facilitator in an effort to ensure the environment is respectful and safe for members to fully participate and share[57] and provide consistency across the rotating group members as trainees leave and enter.[61] This aside, participation in such groups can also offset some mentor's workload in teaching trainees as they offer resources, guidance, and even writing feedback outside of the mentor-mentee relationship.[62,63] Such groups also balance power inequities, as they can provide an opportunity for trainees to become aware of both the official and unofficial power structures at play in their context and in academic writing and publishing.[64–66] As trainees acquire greater disciplinary knowledge, this can lead to less reliance on a mentor to help them navigate their academic program, research, writing, and publishing.[36,65,67]

The focus of a community of practice should reflect the needs and context of a given institution or unit. While one program may find there is a need for a dissertation proposal community of practice, others might identify that a community focused on well-being would be a good fit. Below, I provide an example of a generic type of community of practice: a journal club. Such clubs—wherein professionals and/or trainees regularly meet to discuss the research literature—are one way to socialize trainees into your discipline.[68] They provide regular practice for early-stage researchers and trainees to read and evaluate research studies and offer the opportunity to learn from others.[69] See Box

1.1 for some considerations for organizing a journal club; there are also resources at the end of this chapter for more detailed guidance.

Box 1.1. Activity Idea: Start a Journal Club Using the Below Questions to Guide Your Planning [70]

- What is the journal club's goal? An example goal is to strengthen members' ability to critically evaluate topical research papers.
- What would you like the maximum number of participants to be? Limiting the number of participants can promote meaningful discussion in the time allotted[68]
- Will you hold the meetings virtually or in person? While virtual meetings may provide more flexibility, in-person meetings may offer a greater variety of opportunities for interactions among participants.
- With what frequency will you hold meetings? To avoid overwhelming participants, consider meeting quarterly or, at most, monthly.
- How will you organize the journal club? Typically, one individual presents an article and leads a discussion of it. To promote active engagement, you may circulate the paper to the group before the meeting and identify two primary readers who commit to thoroughly reviewing the paper beforehand.

Serving as a Publication Broker for Your Trainees

As mentioned in this book's introduction, publication requirements for doctoral students are becoming more common. Learning to successfully publish, therefore, is critical for publication-based doctorates, as well as in developing academic and research careers. Furthermore, this is a great way for trainees to learn academic and disciplinary literacies; however, guidance is necessary to help them navigate this complicated terrain.

In particular, the publication process is quite daunting for newcomers and explicit mentorship throughout this stage of writing can easily slip through the cracks.[71] To meet these needs, Barbara Kamler proposed that mentors act as "publication brokers" for their mentees, particularly during the journal revision process.[51] In discussing specific challenges writers face in the revision process, which Kamler described as "being asked to unstitch the garment that took so long to design and make in the first place,"[5] she argued these challenges also require a great deal of skill; for example, needing to revise a text in response to reviewer suggestions while staying within the word limit.

To navigate the publication process embedded in academic and disciplinary literacies' practices, Kamler suggested making such hidden skills explicit as a broker, by acknowledging the complex social, cultural and political dimensions of responding to peer review comments. She gave two noteworthy pieces of advice. First, teach your mentees to read reviewer comments as a text representing opinions rather than "absolute truths," as this works to balance power dynamics and mitigate the negative impact harsh reviewer comments can have on a writer's mental health.[72,73] Second, discuss each reviewer comment with your trainee. Kamler asserted that although there are a variety of how-to resources on this topic, there is nuance in every comment requiring contextualization and discussion. Sitting with trainees to discuss overall approaches (e.g., general strategies for disagreeing with a reviewer suggestion), as well those relating to particular comments (e.g., how to handle two conflicting comments), is essential in guiding them through this complex terrain.[51]

As it should be in collaborative writing, there are potential benefits afforded mentors through the relationship as well. Serving as a trainee's publication broker

naturally dovetails with collaborative authorship with them,[74,75] and publication provides evidence of the mentor's efforts through many hours, days, weeks—possibly years—mentoring the trainee.[74,75]

Using Mentor Texts to Make Things Explicit

The curse of knowledge can cause instructors and mentors to forget to explain certain things or inadvertently skip steps in their instruction due to their familiarity with the material.[45] This can make it challenging for less experienced trainees who are less familiar with academic and disciplinary literacies and practices.[16,76,77] For example, a mentor or instructor may give the advice "tell a story with your research." While this is good advice, novice writers may not be able to employ it if it is not specific enough and broken down into concrete steps with examples.[78]

Mentor texts can help make your guidance more explicit.[79] These texts are example publications or excerpts that serve as resources for writers to evaluate and learn from.[80] When paired with guidance, they encourage trainees to read like writers,[81] as they offer an opportunity to notice disciplinary writing styles, features, vocabulary, and formats trainees can emulate in their own writing.[43,79,82] For example, in the previous scenario about telling a story, an instructor or mentor could review the features of a mentor text that create a "story-like" feel. Mentor texts have been used effectively to help trainees examine and develop disciplinary literacies, including an understanding of disciplinary ways of reading, thinking, and writing.[83] They have also been used to guide second language speaking trainees in learning how to structure their writing and develop arguments, among other uses.[67]

Examples of scientific publications on a range of topics are plentiful and serve as excellent mentor texts. When selecting a mentor text, keep in mind that people process and learn new information better when they can relate to the content.[84] For example, one study showed that college students who were presented with unfamiliar facts about well-known individuals demonstrated twice the capacity to learn and retain those facts as students who were presented with the same number of facts about unfamiliar individuals.[85] These results show that mentor texts related to trainees' existing knowledge can help them integrate new information better than mentor texts that are from unfamiliar topic areas. For this reason, it is helpful to use examples your trainees can relate to. If your trainees are diverse (e.g., if you are teaching a workshop to trainees across the health sciences), use mentor texts on a range of topic areas and avoid material that is too technical. Using mentor texts representing a range of settings and cultures is a recommended practice to promote a sense of inclusiveness and equity.[86]

Mentor texts can be used in a variety of ways to teach and train trainees. One approach revisited several times in this book is the *says/does analysis*, in which trainees are asked to identify arguments being made throughout a text, linking the words a writer uses to make an argument to the function the words are serving within the text. For example, identifying that the phrase "perinatal depression is associated with increased risk of premature delivery, health problems among offspring, among other adverse health outcomes" is making the argument that perinatal depression is a consequential health issue to address—a standard argument in the introduction section of a journal article. The says/does technique is described more fully in the next chapter.

Uncover Hidden Concepts and Skills Through Feedback and Writer Engagement

Chapter 9 provides detailed guidance on giving feedback, with examples and activities to help mentors and instructors reflect on the type of feedback they give and whether it is helping them meet their teaching and mentoring goals. Here, I make three overarching points that carry through themes of the book. The first relates to the tension between focusing on sentence-level issues (grammar and spelling) versus those focusing on the big-picture. The second highlights key approaches to convey clear, explicit feedback that encourages trainees to reflect on and respond to it. The third point urges you to consider student agency in your feedback exchanges.

The first point addresses an issue that has been documented in the scholarly literature: instructors and mentors tend to focus on sentence-level issues, sometimes at the expense of responding to content and ideas.[14,23,24,87–89] Ideally, feedback is leveraged as a powerful opportunity to support writers in shaping and sharpening their intellectual content and arguments, as well as providing an avenue to guide disciplinary ways of thinking, working, and communicating.[6,90–92] It's true that sentence-level issues are important in creating a clear, polished product. However, these issues should be attended to exclusively in later stages of writing. Chapter 4 discusses staging writing assignments to implement this approach.

The second point addresses the problem that many writers simply do not understand the feedback written on their papers.[93–95] Here, I emphasize being explicit when giving feedback, and explaining why you are making a suggestion or questioning a passage. For example, Nancy Sommers, a scholar who has studied writing development in higher education for decades, suggests that the language we use to respond to writers on the page should not be different than the language we use to speak to writers

conversationally. She suggested that rather than using what she refers to as "hieroglyphics," such as squiggly lines and other symbols trainees may struggle to understand,[89] we use conversational language to provide feedback to student writers.[88] She even goes so far as to recommend instructors and mentors format their summary comments as a letter, using a salutation (Dear Juan), and signing it as you would a letter or email.[88] The literature also suggests that instead of leaving comments such as "be specific" and "develop more," instructors and mentors should provide more context and explain why they are making the suggestion and give advice or examples that shed light on how the feedback can be implemented.[88,91,94] Tying your comments to disciplinary ways of thinking and writing will be especially helpful to newcomers.[6,23]

A key insight from writing scholars in the works cited above and others is that instead of considering feedback as a one-way delivery of directives, instructors and mentors should engage in a dialog with writers about their writing.[73,88,95] Discussing your feedback with a writer can be accomplished in a brief (10-15 minute) conference with a trainee (for example, one dedicated class period during a semester); this practice is recommended by writing pedagogy experts.[21,23,95,96]

Research has identified that when trainees don't understand feedback, they may take their writing in a different direction than the feedback actually suggests or they sometimes ignore it altogether.[97] However, when a writer is asked to respond to feedback, and in particular identify any comments they did not understand, the door is open for them to express confusion about a comment, leading to greater clarity in the feedback that took an instructor so long to create.[97] One means to engaging writers about the provided feedback is the use of reflective coversheets.[88,97,98] These coversheets are very

short summaries (200-300 words) of a writer's revision approach to the draft they are submitting. An instructor or mentor can ask writers to describe the biggest changes they made in their revised draft, as well as which feedback was most and least helpful. If they did understand a comment but disagree with it or feel something they wrote was misunderstood, the writer has a chance to more fully engage in the feedback exchange and address the issue. Signaling to trainees that feedback is more of a two-way exchange rather than a required prescription for their revision is helpful in them developing agency.[21]

A related third point, is the importance of considering feedback as a means to promoting trainees' authority and authorship. The power differential between a mentor or instructor and a student is considerable. This disparity manifests in a variety of ways. Firstly, as Sommers points out, comments that are too directive can shift a student's mindset from "'This is what I want to say' to 'This is what you the teacher are asking me to do.'"[99] Secondly, if you do not ask trainees to respond to your feedback, they may not question it, even in the case where they feel you misunderstood what they were trying to say.[21,88] Part of developing a scholarly identity is carving out and defending one's own ideas; as Ann Blakeslee points out, mentors must relinquish some authority to provide trainees adequate writing experience.[37] A final point related to the power dynamic between a mentor or instructor and their trainee is that this process helps prepare trainees for responding to journal peer reviewers; for example, responding to a reviewer comment they disagree with.

To close, I point to the fact that, more broadly, beyond writing, socializing trainees into a discipline is a two-way exchange.[6] Scholarly communities, of course, are

not static and new ideas are essential to move science forward. Once trainees are familiar with the conventional ways of working within a particular discipline, they are better positioned to challenge the status quo and propose new ways of working.[6] To do this, they need a sense of agency and autonomy, as well as a deep understanding of their discipline.[90]

Related Open-Access Resources

- Free, online platforms such as AuthorAID provide a range of scientific writing and publishing resources, including those on planning a journal club.
- McGlacken-Byrne SM, O'Rahelly M, Cantillon P, et al. Journal club: old tricks and fresh approaches. Archives of Disease in Childhood - Education and Practice 2020;105:236-241. https://doi.org/10.1136/archdischild-2019-317374
- August E, Brouwer A. How to Write an Effective Journal Peer Review Using a Staged Writing Approach: A Best-Practice Guide for Early-Career Researchers. *International Journal of Epidemiology*. 2024; 53(6). https://doi.org/10.1093/ije/dyae154.

Instruction Planning Ideas

- Investigate what resources already exist in your academic unit and institution that may be a resource to help your trainees grow professionally. For example, does a journal club already exist that might be a good fit for one or more of your trainees?

Chapter 2: Helping Writers Create Meaning With Stronger Reading and Source Use Skills

Reading Is Integral to Science, but the Training Is Lacking

Reading is an essential part of many aspects of the scientific process,[100] yet formal reading instruction typically ends in primary school. This is unfortunate, particularly since reading material becomes more complex with each stage of education,[101] and because deep reading is strongly linked to critical thinking. In this chapter, I define reading as the experts do, describe common challenges readers face in deepening their skills, provide strategies for deep reading, and offer teaching approaches to help you encourage your trainees to improve their skills.

Importantly, reading involves negotiating textual and non-textual elements. Whenever I refer to reading material in this book (i.e. any reference to "a text"), I am referring to words as well as visual elements such as charts, maps, tables, and images that are a central part of our scientific discourse.

Good Reading Skills Involve Making Meaning as You Read

When asked to characterize good reading skills, many less experienced readers will refer to comprehension and speed.[102] Experts, however, define reading simply as creating meaning through engagement with a text (while acknowledging that comprehension is a necessary part of reading).[103] Imagine a simple example of creating meaning through reading. Say you are reading a descriptive article showing that a certain type of rare brain tumor is more likely to be present in those who have a higher frequency of gene X. The paper's discussion suggests that, based on the article's findings, all newborns should be screened for gene X. As you read the discussion, you realize that you

do not agree with the authors' suggestion of spending our precious healthcare dollars screening the entire population to identify brain tumors that occur in a tiny proportion of the population. Instead, you draw your own conclusions about appropriate next steps to address this health problem. In this example, making meaning refers to drawing your own conclusions versus simply accepting the premise of what you are reading. In another scenario, you might make meaning by integrating your background knowledge with what you are reading to draw conclusions that are more nuanced compared to what is presented in an article's discussion.

The amount and type of meaning a person creates from reading depends on the extent of their background knowledge, the context and purpose of their reading, and the nature of the writing.[100] It also depends on their reading skill level.[102] In her excellent book, *A Writer's Guide to Mindful Reading,* Ellen Carillo described the essence of reading as "about creating meaning, not finding it."[103] Carillo's description demonstrates how experienced readers negotiate texts. They connect their prior knowledge to the new information presented, monitor their comprehension while reading, and draw inferences that are independent of the authors during and after reading. Additionally, unlike novice readers, experienced readers adjust their reading strategy to their purpose and read much more actively.[102] More information about reading strategies follows.

Reading and Critical Thinking Are Reciprocal

Stronger reading skills are associated with better developed critical thinking skills.[12,104] Critical thinking is defined here as "a process of purposeful self-regulatory judgment that drives problem-solving and decision-making."[105] For example, readers draw on their critical thinking and use their existing knowledge to assess the credibility of

information and the strength of an argument in the text before them.[105] The deeper a person reads, the sharper their critical thinking skills become.[106]

Reading Is an Integral Part of Writing

The philosopher and literary scholar Kenneth Burke likened academic discourse to a parlor where researchers build on each other's ideas by reacting to, critiquing, and extending them. Reading the work of others is an essential part of the research process because it allows a writer to understand the context in which their research takes place, to know what has and has not been done, and what future needs exist.

In this book, reading is considered to be part of the writing process because readers generate new ideas and arguments through engaging with a text, and many of these ideas and arguments will make their way into the reader's own writing.[101,103] The process of reading is similar to that of writing, and some authors have even conceptualized how these processes mirror one another. For example, like writers, readers define the purpose of their reading and they make and revise meaning as they consider and reconsider the text.[107] Reading is also connected to writing because writers read their own drafts and make decisions about what to revise. The process of revision is where reading and writing become one integrated recursive process.

Problem Areas Where Readers Tend to Get Stuck

Many trainees across educational levels struggle with reading.[103,108] In higher education, while most can recall and summarize what they read, many struggle to read critically.[109,110] For example, data show that university students struggle to weigh and judge arguments as well as to critique and interpret texts.[109]

Specific challenges for struggling readers include material for which they are not the intended readers, lack of familiarity with the background knowledge and/or vocabulary used in a written document, being unfamiliar with the context of the piece, being unfamiliar with the type of document (e.g., an academic journal article), and lack of experience interpreting visuals or graphics.[103] A primary reason readers struggle with these skills is the lack of transparency around what deep reading looks like and the lack of explicit instruction on deep reading. The next section describes reading strategies that help readers critically evaluate and make meaning from a text.

Helping Readers Deepen Their Practice With Reading Strategies

Instruction on reading strategies—even at the graduate level—can help readers learn to engage more deeply.[111] It is not enough to simply assign reading or ask your trainees to read more. Less experienced readers need strategies to become careful and competent consumers of information,[100] and they need to learn and practice a range of strategies for their own reading. It is important to share what it means to be a successful reader with your trainees, referring to the definition above and contextualizing it to your discipline and then working with them on relevant strategies.[34]

Below, four key strategies to help readers navigate different types of reading for different purposes are presented. Experienced readers already use many of these strategies, although they may have become so habituated that they no longer realize they are using them.[103] Explicitly incorporating these strategies into your writing instruction will help your trainees improve their reading, writing, and critical thinking skills. It will also improve their appreciation of your discipline's ways of thinking, performing activities, making claims, and supporting those claims.[41]

Strategy 1: Define purpose of the reading, and plan reading strategy accordingly

Goal: The goal is to become more mindful about the reading purpose and the need to be intentional about using a strategy that aligns with the reading purpose.

Overview: This strategy helps a trainee identify the purpose for reading and then choose a reading strategy to meet that purpose.

Example: Examples of this strategy are shown in Table 2.1.

Table 2.1. Example Reading Purposes and Corresponding Reading Strategies

Reading Purpose	Corresponding Reading Strategy
Deciding whether a source is worth close reading and/or including in a literature review	Previewing (see below for description of this reading strategy)
Synthesizing information into a literature review	Close reading with annotations[103] (see below for description of this reading strategy)

When to use the strategy: This strategy is useful for every reading occasion.

Benefits: Defining a purpose for reading helps less experienced readers learn to engage with texts as experts do: selectively according to their purpose.[112] This approach supports readers in being more self-directed, mindful, and efficient in their reading.[100,102,103]

Strategy 2: Previewing (sometimes referred to as skimming[103])

Goal: The goal is for the reader to orient to the text.

Overview: Previewing helps readers get a quick overview of a text's content and structure.[103] This overview provides a sense of the document's message and allows a reader to determine the fit of the text with their purpose(s).

When to use the strategy: A reader should use previewing when they are deciding whether (depending on their purpose) the material is worth taking the time to do a closer read. Previewing can also help a reader identify the difficulty of the text so they may adjust their strategy accordingly.[102]

Benefits: The benefits of previewing are similar to those of selective reading. This strategy helps readers in being more self-directed, mindful, and efficient in their reading.[100,102,103] Specifically, this strategy helps a reader maintain a distance from a source rather than getting wrapped up in the details, better allowing them to make judgements such as whether a text will be a good resource for a writer's paper.[103]

Strategy 3: Read selectively and non-sequentially according to the reader's purpose

Goal: Here, the reader strives to be focused and efficient, tailoring what is read and the order of reading to their situation.

Overview: This strategy involves reading selectively in any order, only reviewing parts of the text that seem important given the reading purpose and how much the reader already knows about the topic. For example, a selective reader might review a research article by scanning the title, abstract, visual elements (e.g., figures, tables), the headings in the results section, and the conclusions.

Example: A reader is interested in replicating what appears to be a similar study to theirs. They start by scanning the title and abstract to see if the paper is relevant, then skip to the research aims at the end of the introduction, and then carefully read the methods section.

When to use the strategy: This strategy is useful for every reading occasion.

Benefits: Similar to the above strategies, this approach supports readers in moving through their information gathering process with greater agency, efficiency, and mindfulness.[47,102,112]

Strategy 4: Close reading (sometimes referred to as deep reading)

Goal: The reader aims to synthesize information from the text with their existing knowledge to create new meaning.[100]

Overview: Here, someone carefully and critically reads the material, evaluating the content, arguments, and evidence presented. The reader weighs the credibility of the information based on their knowledge and what is presented in the text, and then draws inferences from the text.

Example: Examples of close reading strategies are presented in Box 2.2 and Table 2.2, as well as Box 2.3 and Figure 2.1 a bit later in the chapter. Box 2.2 provides an overview of text annotation, a close reading strategy, and Table 2.2 provides an example of a text annotation strategy called a double-entry journal.

Box 2.2. Activity Idea: Text Annotation (A Close Reading Strategy)

Goal: The goal of annotating the text is to make the critical reading process visible by actively responding to, and creating meaning from, the text. This helps a reader focus on comprehension and creating new ideas in response to a text.[102]

Overview: In this type of close reading, a person makes notes, comments, and raises questions in response to the text they are reading to support critical reading skills and meaning making. Annotations also serve as a link between reading and writing. They are a bridge that allows someone to identify patterns in a text and can be considered a

very early writing draft. Annotations will reflect the meaning a reader constructs based on their reading purpose and the text.

When to use the strategy: The strategy is useful to synthesize findings from a literature review, noting areas of strength and weakness in what has been done, so that someone may appropriately build on the literature with a new study.

How to use the strategy: Respond to a text with notes, comments, and questions. These comments can be written electronically in a digital file or by hand in the margins of an article. Note that annotating reading material goes beyond just highlighting text or starring key passages. Annotating involves actively responding to the text with comments, critiques, and questions.[103]

One specific strategy for annotating a text is called the double-entry journal (also called the dialectical notebook).[113] This activity, which should be tailored to the pedagogical purpose of your instruction, asks readers to populate a two-column table in response to their reading. For example, they could summarize information or a claim from the text in the first column, and in the second column, comment on the content in the first column. These comments could include questions, comments, critiques, or other types of reflections such as whether the information fits with other articles they have read, the difficulty level of the article, a rating of the paper's helpfulness in achieving the reader's goal, etc.

Table 2.2 shows an example of a small number of double-entry journal entries annotating the 2017 article by Gottschlich A., et al. *Acceptability of Human Papillomavirus Self-Sampling for Cervical Cancer Screening in an Indigenous Community in Guatemala*[114] (The article is shown a bit later in the chapter).

Table 2.2. Example of a Double-Entry Journal, a Type of Text Annotation (A Close Reading Strategy)	
Quotes or summaries of text	**Reader notes**
"Thus VIA is often called a "see/screen-and-treat" or "one-visit" approach.[7]"	I like the way they describe visual inspection with acetic acid in everyday terms that are catchy and easy to remember.
"We sampled 212 women aged 18 to 60 years from nine neighborhoods that encompass 85% of the population of Santiago Atitlan."	I wonder why they did not include those younger than 18 years?
"Hence, a logical next step would be to conduct longitudinal studies that compare rates of follow-up care among women who have tested positive with rates for those who have not been screened for HPV…"	In a longitudinal study investigating follow-up care in those who did versus did not test positive for HPV, I think you would need to balance the groups so they had a similar proportion of women of low income or adjust for income level so this did not skew the findings.

Box 2.3 and Figure 2.1 provide an overview and an applied example of another close reading strategy, the says/does analysis (sometimes referred to as genre mapping[115,116]), respectively. This type of activity draws from the work of John Swales,[117] who identified[2] that research articles use standard types of arguments—he

[2] Reflected in his Create a Research Space (CARS) model[117]

called these "rhetorical moves"—to persuade readers. The says/does analysis helps readers identify the roles of sentences in a paper's broader arguments.[115] This activity can be particularly helpful for second-language trainees, who may come with a different cultural orientation to writing that does not align with the standard arguments used in scientific publications.[6]

Box 2.3. Activity Idea: Says/Does Analysis (A Close Reading Strategy)

Goal: The goal is to focus a reader's attention on a deeper level of meaning in the text; for example, focusing on the quality of the author's argument as opposed to focusing on the facts in their claim. It also helps sensitize readers to the subtle forms of persuasion that are being used throughout a text.[102]

Overview: Here, the reader links content (what the text *says*) with the function within the text (what it *does*).[103] This approach helps trainees read like writers.[80]

When to use the strategy: This strategy is helpful when readers are learning to read (or write) in a new document type; for example, if they are just learning the structure of a scientific journal article.[103] This type of analysis can also help readers shift their focus away from content and refocus on how sections of a text function; in other words, the work a text is doing.

How to use the strategy: For a scientific article, readers can review the typical arguments that are made in each section of a journal article and identify where each of these standard arguments are being made. They can also evaluate the effectiveness of the arguments. This strategy can also be used for visual elements such as figures or tables; for example, a trainee can be asked to analyze a figure and identify the main message or argument being made.

In the applied example in Figure 2.1, a reader has annotated (see red text boxes) the major components of an introduction section of a scientific paper. The focus is on the function of the text rather than the content.

Figure 2.1 Applied Example: Example of a Says/Does Analysis (A Close Reading Strategy)

original report

Acceptability of Human Papillomavirus Self-Sampling for Cervical Cancer Screening in an Indigenous Community in Guatemala

abstract

Purpose Cervical cancer rates in Latin America are higher than those in developed countries, likely because of the lower prevalence of screening. Specifically, less than 40% of women in Guatemala are regularly screened and even fewer women are screened in indigenous communities. Current screening strategies—Pap smears and visual inspection with acetic acid—might not be the most effective methods for controlling cancer in these settings. We thus investigated the potential of self-collection of cervical samples with testing for human papillomavirus (HPV) to help prevent cervical cancer in an indigenous community in Guatemala.

Patients and Methods A community representative random sample of 202 indigenous women age 18 to 60 years residing in Santiago Atitlan, Guatemala, were surveyed to assess knowledge of and risk factors for HPV and cervical cancer. Women were then invited to self-collect a cervical sample using HerSwab collection kits to assess the prevalence of HPV and the acceptability of self-sampling.

Results Of 202 women who completed the survey, 178 (89%) provided a self-sample. In all, 79% of these women found the test comfortable, 91% found the test easy to use, and 100% reported they were willing to perform the test periodically as a screening method. Thirty-one samples (17%) were positive for at least one of 13 high-risk HPV types, and eight (4.5%) were positive for HPV 16/18.

Conclusion HPV testing by using self-collected samples was well accepted, suggesting that it is a plausible modality for cervical cancer screening in indigenous communities. Further studies are needed to assess rates of follow-up after a positive test and to determine whether these findings extend to other indigenous and nonindigenous communities in Guatemala and Latin America.

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Anna Gottschlich

Alvaro Rivera-Andrade

Edwin Grajeda

Christian Alvarez

Carlos Mendoza Montano

Rafael Meza

Author affiliations and support information (if applicable) appear at the end of this article.

Corresponding author: Rafael Meza, PhD, University of Michigan, School of Public Health II, Room 5533, 1415 Washington Heights, Ann Arbor, MI 48109-2029; Twitter: @meza_rafa; e-mail: rmeza@umich.edu.

Why this research is important

INTRODUCTION

Cervical cancer (CC) is preventable with appropriate screening and treatment. Pap smears, the most common form of screening, allow physicians to detect and manage pre-cancerous lesions before they develop into CC.[1]

What is already known about this topic

Because of the success of screening programs that use the Pap smear, CC rates are low in most high-income countries.[2,3] Nonetheless, CC is the third most common cancer worldwide and a leading cause of death among women in low- and middle-income countries (LMICs).[4] Unfortunately, Pap smears are infrequently used in LMICs because they are expensive and require physicians, pathologists, and cytotechnicians to perform the procedure and interpret the results.[3,5] Even in LMICs with screening programs, rates of participation tend to be low[6] because Pap smears must be collected and analyzed at hospitals or other high-resource health facilities that women may not have access to.

Background information

Background information

In addition, if women have abnormal results, they must return for follow-up assessment and/or treatment, which creates greater time and financial burdens.[7] The logistics of sample collection by health care providers, which then must be sent to laboratories, tested, and returned, can also be challenging in these settings. There are also cultural barriers that preclude the use of screening methods associated with sexually transmitted diseases (STDs).

Hence, many LMICs have adopted CC screening programs that use visual inspection with acetic acid (VIA). VIA involves placing acetic acid on the cervix and looking for a change in color to

Why readers should care about this research

detect lesions. This procedure is less costly and invasive than Pap smears and can be performed by trained laypersons in low-resource health facilities.[7-9] In addition, VIAs give the option to treat women with cervical lesions immediately. Thus VIA is often called a "see/screen-and-treat" or "one-visit" approach.[7] Previous studies have shown that VIA screening helps reduce CC incidence and mortality in low-resource settings.[8] However, VIA shares some of the same barriers associated with Pap smears, so despite these efforts, CC incidence and mortality remain high in many LMICs, presumably because of persistent low rates of screening with either approach.

Human papillomavirus (HPV) infections are responsible for more than 90% of CC cases.[10,11] There are 13 types of high-risk HPV associated with development of CC.[12] Of these, types 16 and 18 account for approximately 70% of all cases.[13] Cervical HPV tests have high sensitivity (approximately 90%) and specificity (> 80%).[14,15] Women who test positive for high-risk HPV should follow up with a Pap smear and/or VIA or treatment, depending on each country's setting and resources,[16] but a negative test means the risk of developing CC in the next few years is minimal, lower than the risk after a negative Pap smear.[17] Furthermore, when Pap smears are performed only on women who have tested positive for HPV, the relatively low sensitivity of screening by using Pap smears is significantly improved.[15,18] Thus, primary screening for high-risk HPV before referral for Pap smear or VIA has been proposed as an alternative CC screening method. Unfortunately, HPV testing is expensive and requires infrastructure not readily available in many LMICs. Nonetheless, research is underway to develop low-cost HPV tests that can be used with minor infrastructure requirements.[19-23]

Background information

Self-collection HPV kits have been developed to allow women to collect their own cervicovaginal samples at home and send these to a testing facility through the mail or by other means. Studies in several countries have compared the accuracy of HPV self-collection samples with samples obtained by a physician and have assessed the acceptability of self-collection in different populations.[5,24-30] Some studies have provided women with self-collection kits, but at medical facilities before collection by a physician rather than at the woman's home. In these studies, self-collection has been shown to have sensitivity similar to that of physician-collected samples,[5,24-28] and self-collection has been found to be highly acceptable in many settings.[24,26-28,31] This suggests that self-collection could be helpful to increase CC screening rates in LMICs, once cost- and infrastructure-efficient HPV tests have been developed. However, few studies have provided participants with the opportunity to try these in community settings outside of medical facilities; thus, it is not clear whether they would be an accepted form of primary CC screening.

What is already known about this topic

What is not known: the gap in the literature

Guatemala has one of the highest levels of CC morbidity and mortality in the region. Age-standardized annual incidence and mortality rates are 22.3 and 12.5 per 100,000 women, respectively,[11] largely because less than 40% of Guatemalan women (who have a relatively high prevalence of HPV[32-34]) have ever been screened for CC.[6,35] There have been self-collection studies conducted in Latin America, a region in which CC morbidity and mortality are particularly high,[5,36-39] although few have tested the acceptability of HPV self-collection in community rather than clinical settings. Moreover, HPV self-collection has not been studied in indigenous populations in Latin America, who tend to have less access to health facilities and higher levels of stigma associated with physician-administered vaginal and STD tests.[40] Thus, it is important to assess the acceptability of HPV self-collection kits and tests and determine the potential of HPV testing as a screening modality in these settings.[37] We thus conducted a cross-sectional study in an indigenous population in Lake Atitlan, Guatemala, to assess knowledge of HPV and CC, provide women with the opportunity to collect a self-sample in their home and report their feelings and experiences, and assess HPV prevalence in indigenous populations.

Why it's important to learn the information identified in the gap

What is known about this topic

What is not known about this topic

Why it is important to learn the new information the study provides

Study aims

PATIENTS AND METHODS

We conducted a cross-sectional study in Santiago Atitlan, an indigenous community of 45,000 residents in Guatemala. Data were collected by using electronic surveys and self-collection kits.

Description of study design and setting, and overview of data collection approach

Study Population

This community is almost exclusively Tz'utujil, a Mayan indigenous group. We sampled 212 women age 18 to 60 years from nine neighborhoods that encompass 85% of the population of Santiago Atitlan. Population data were obtained from the local municipality. We followed a stratified sampling approach by first allocating samples of size N_c to each neighborhood according to its relative population size ($c = 1, \ldots, 9$) and then randomly selecting a sample of N_c blocks. One house was randomly selected per block, in which one woman was interviewed.

Description of study population

Description of sampling and recruitment strategy

Strategy 4: Close reading (sometimes referred to as deep reading [continued])

When to use the strategy: Use close reading to evaluate the quality of a study or to critically examine the features of a paper. For example, evaluate the references cited to support a causal claim; if the authors cite cross-sectional or descriptive studies to support such a claim, the evidence is weak and the reader should be skeptical of the claim. Evaluating the study's funding source to identify potential conflicts of interest can be another way to examine the credibility of the information in a text.

Benefits: Close reading allows scholars to enhance their comprehension of a text.[102,103] It also helps readers to be critical consumers of information because it requires deep engagement with a text, evaluation of its arguments, and creation of judgements about its claims.[100] Close readers synthesize textual information with what they already know and construct new meaning, helping them develop as independent thinkers and scientists and, ultimately, their academic identity.[6,47,102,103]

Key Reading Support for Second Language Writers

Second language writers face specific challenges that may impact their skill level and progress. These readers may be slowed down, for example, by word-by-word translation and this approach can interfere with reading comprehension. Additionally, such individuals may be less familiar with disciplinary vocabulary compared to others reading in their primary language.[118] Second language writers also tend to rely on the original wording of a text when summarizing and often struggle to use their own words to paraphrase.[24,111]

Instructors can help second language writers increase their awareness of the limitations of their existing strategies and encourage them to try new ones. For example,

experienced readers (regardless of their language status) have a higher tolerance for ambiguity and initial confusion[102] and focus on the overall meaning of a text. This approach of first focusing on understanding the overall meaning without getting bogged down trying to understand every word will be helpful to second language readers.[118]

Additionally, summarizing is a key skill for second language writers, as it helps them distinguish between the main points and details.[111] Emphasizing summary as a first step in the reading process will be helpful for this group of readers.

Helping Trainees Learn to Avoid Plagiarism

On the surface, the concept of plagiarism seems clearcut, but it quickly gets complicated.[119] To help trainees learn to navigate this academic literacy, an instructor or mentor can use a three-pronged approach: define plagiarism, provide context about relevant guidelines, and provide practice in learning to avoid plagiarism.[120] First, define plagiarism for your trainees within your context.[120] Definitions of plagiarism vary, but you can guide trainees to your educational institution's definition and in a "publication broker" role, make clear plagiarism standards for publishing.[121–123] For example, resources such as the Committee on Publication Ethics, the International Committee on Medical Journal Editors, and the American Psychological Association Style guidelines all provide guidance on plagiarism in the context of publishing.

Second, explain how plagiarism is handled in your academic and publishing contexts. For example, how does the trainee's academic institution handle plagiarism in terms of how are the rules conveyed and made available, and what are the possible penalties?[120] Review the consequences of plagiarism in academic publishing, providing

examples as appropriate (websites such as Retraction Watch can be helpful in identifying such examples).

Third, offer trainees instruction on and learning activities to help them learn to avoid plagiarism. A key skill that helps students avoid plagiarism is the appropriate use of sources.[124] Some examples of skills supporting effective source use include how to identify appropriate sources such as those from a peer-reviewed source; recognizing, reading, and understanding different types of sources (e.g., primary sources that show data or first-hand evidence versus secondary sources that discuss a primary source or papers reporting original research versus editorials or commentary); avoiding the use of generative artificial intelligence such as ChatGPT as a source due to bias, inaccuracy, and the fact that it is not a primary source; summarizing sources; integrating quotations, summaries, and paraphrases into a new text; and understanding when a citation is needed.

Instructors and mentors may feel that they simply don't have the time to instruct their trainees on appropriate source use. However, simple activities like requiring trainees to annotate their sources help to set them up for success. Asking students to annotate their readings (and avoiding pasting text directly from sources to their annotation document) is helping them use sources appropriately. If they are available, librarians can also be a helpful resource in instructing trainees.[22] Mentors can pool their trainees and take turns providing guidance and instruction on the topic, thus sharing the load. Finally, incorporate what is possible within your time and curriculum constraints. For example, integrating even a single activity or learning objective into a course or assignment can impact student learning. Box 2.4 and Box 2.5 show and sample activities and sample learning objectives that can be integrated into an assignment.

Box 2.4. Activity Ideas: Support Trainees in Enhancing Their Source Use and Help Them Avoid Plagiarism

- Create an example of plagiarized text and ask trainees to identify specific problems with the use of sources. What should the authors have done differently in composing the text? Ask trainees to work together to revise the text so that it does not plagiarize.
- Share scenarios that are a bit more nuanced in complexity; for example, using an idea or text from a primary source a writer identified in a secondary source, without acknowledging the primary source. Ask trainees to identify specific problems with an approach and how to appropriately revise it.

Box 2.5. Assignment Idea: Sample Learning Objectives That Can Be Integrated With a Writing Assignment to Help Students Learn Effective Source Use

- Distinguish between low- and high-quality sources.
- Apply good citation practices when paraphrasing information from a source; for example, attributing ideas to the appropriate source, avoiding direct quotations, and citing only primary sources and avoiding the citation of secondary sources.

Additional discussion about guiding the use of technology, such as ChatGPT, in writing assignments is presented in Chapter 8.

Related Open-Access Resources

- Carillo Ellen C. *A Writer's Guide to Mindful Reading*. https://doi.org/10.37514/PRA-B.2017.0278

Instruction Planning Ideas

- Consider the difficulties your trainees experience in reading, comprehension, and meaning making. Identify whether a strategy in this chapter might help your trainees improve their reading skills.

Chapter 3: Encouraging Writers to Reach Their Readers Using Rhetoric

The term *rhetoric* is commonly misunderstood as empty words one might hear in a political speech or advertisement. Rhetoric, however, plays a critical role in scientific writing. When referring to rhetoric's role in the context of doctoral writing, Anthony Paré maintained that "texts should *do* something, not just *say* something."[125] In other words, texts should have a clear purpose, aiming to create an outcome, such as influencing attitudes or practices, which gets to the heart of what rhetoricians mean by rhetoric. As foundational as rhetoric is to all kinds of communication, definitions of it are often so broad that it can feel elusive. William Duffy acknowledged this when he referred to rhetoric as "a word everyone seems to know but few can define."[126] In his essay, he contended that almost every type of human behavior can be understood as rhetoric; however, he made the concept more concrete by asserting that our definitions of rhetoric depend on the context.

In the context of scientific writing, rhetoric can be thought of along three dimensions: 1) achieving effective communication; that is, whether the text accomplished its purpose;[126] 2) being persuasive; i.e., using language to sway readers;[126] and 3) using language—in our case, disciplinary language—to create and shape knowledge. This conceptualization resonates with the development of a scientific publication.[126]

The concept of rhetoric, however, extends beyond simply putting words on a page to achieve a purpose, persuade readers, and create knowledge. It is connected to a rich and dynamic context—referred to as the "rhetorical situation"— that encompasses the above concepts as well as additional contextual information.[125] The rhetorical situation calls writers to respond to events that gave rise to the writing, such as high infant

mortality or a new pandemic, as well as a consideration of the readership and their background, values, and purpose in reading the text.[125,127,128] It also encompasses the consequences of that communication, such as a new health guideline or a change in the way people think about a particular issue. The concept of the rhetorical situation highlights that writing is a social activity, and that any given publication is embedded in a set of circumstances.[125,127,128] These circumstances shape the purpose of the writing, the readership who we attempt to persuade, and the role of writing in shaping knowledge.

I have organized the below sections roughly in the order you may find most helpful when instructing trainees, starting with a reflection on the broad contextual concepts and ending with a narrower discussion of specific language phrasing. I have interwoven short explanations of concepts with applications for writing activities and other strategies that may be helpful in supporting writers in learning to reach their readers using rhetoric. I close the chapter with a discussion of genres and how they fit with the concept of rhetoric.

Asking Your Trainees to Consider the Rhetorical Situation

Asking your trainees to reflect on key contextual information before they begin drafting their paper will support them in creating an intentional and effective paper.[129,130] Planning activities, described more fully in Chapter 5, provide an opportunity for writers to plan their process, sort their ideas, plan content, and organize their arguments.[25,46,131] Planning may be accomplished through informal writing or talking through rough ideas with peers; they do not require grades or instructor feedback.

One good place to start in having trainees plan the content of their paper is asking them to consider their study's rhetorical situation, including the problem they plan to

address with their research.[12] This informal pre-writing can help trainees clarify their thinking about the problem they plan to address,[46,131,132] and consider how their study fits into the published literature. Trainees can also be asked to reflect on the goals of their paper alongside their intended readership to consider what they want their paper to do.[125,133] Focusing on arguments and how to reach an intended readership is a critical part of developing trainees as writers and helping them achieve their goals with their writing.[131,134] Considering these things will help them better respond to the situation.[116,135] Box 3.1 shows a sample planning activity that should be modified for your trainees to fit your own context. Trainees can either write in response to the prompts or they can share their thoughts through a conversation with a peer. this discussion format highlights the social aspect of writing, as each trainee works to create meaning through their discourse.[52,131]

Box 3.1. Activity Idea: Help Writers Consider the Rhetorical Situation Through Content Planning to Prime Them to Better Respond to Readers[133]

Drawing from your readings, annotations, thinking about your paper, respond to the following three prompts.

1) What is the problem you seek to address with your research and the affected population (i.e., the events that gave rise to the writing)?
2) Who is your ideal readership? Describe their professional identities, their values or perspectives, and speculate about why they might be interested in reading your paper.
3) What results do you hope to achieve by publishing your paper? For example, do you hope your paper leads to a new health guideline, a new avenue for study, a

policy conversation, or a change in the way people think about a particular issue?

A core aspect of rhetoric is persuading readers, and to do this a writer needs to identify the readers, craft arguments to reach them, and anticipate how they will respond to the text.[3,125,136] While there are many practical issues to consider when choosing a target journal (for example, the frequency with which the journal publishes), trainees should first consider a critical question: Who are their ideal readers?

Reflecting on key elements of the rhetorical situation can help a writer decide who the ideal readership is. For example, if a student is investigating a new modeling approach to analyze spatial data in which environmental contamination is not a point source but distributed along a canal, then a methodological journal and readership may be the best fit. Whereas if a trainee is investigating e-cigarette use in pregnancy, they will need to consider whether a tobacco journal, a reproductive health journal, or a different type of journal is the best choice. This depends on how the researchers envision the goals of the paper and applications of the findings. Is the goal to change tobacco policy? Or to change screening practices in antenatal care visits? They should think through who they most want or need to reach with their findings, which likely reflects who can make the best use of the information. Answers to these questions will help such researchers identify an appropriate readership for their paper, and from there they may consider additional information (such as publication frequency, acceptance proportion, and others) so they can choose from a short list of a journals that serve this readership. Practical strategies for narrowing down a target journal are presented in Chapter 14.

Understanding the Rhetorical Situation Helps Writers Respond to Readers

Trainees, particularly those with less experience, might view scientific writing as objectively presenting facts, and may even view persuasive arguments as being inappropriate for scientific writing, preferring to "let the facts speak for themselves."[137,138] Being explicit about the concepts in this chapter will provide a grounding to help trainees understand that the success of scientific texts is completely dependent on rhetoric.[34,136,138]

The standard arguments made in an academic paper—known in the writing world as "rhetorical moves"—were characterized by John Swales in his CARS (creating a research space) model.[117] Such an argument that appears in the introduction section of a paper is a justification of why the research problem is important to address. At a deeper level, writers should tailor their arguments to their readers' professional identities, activities, and values.

While we often make this argument in terms of burden of, or mortality from a health condition, as seasoned researchers, we go deeper to tailor such arguments to resonate with the readership. This type of tailoring may have become so habituated that we may no longer fully realize we are doing so, and this approach should be made explicit to the writers we teach and train.[6,46] Going back to the example of the use of e-cigarettes in pregnancy, the topic's importance may look different for tobacco policy makers or researchers versus obstetricians due to the different context in which they function, and guiding your trainees to provide such nuance will help them become more effective writers. Box 3.2 displays a sample informal pre-writing activity to help writers plan their introduction section arguments. This activity will help them start thinking about their readers so they can more effectively persuade them the study is important and

needed. The activity touches on a second conceptualization of rhetoric: achieving a purpose. This purpose can be emphasized in arguments about the problem and importance of the research.[117] Finally, the activity is meant to help trainees reflect upon another rhetorical goal: the creation of knowledge; the moves made in the introduction section help a writer set up their own contribution to knowledge.[117,135]

Box 3.2. Activity Idea: Informal Pre-Writing to Plan the Use of Rhetoric to Persuade Readers of the Study's Importance and Purpose (this activity may be split into two separate activities, first, creating an outline and second, connecting these arguments to aspects of rhetoric).

Create an informal outline each of the below standard introduction section arguments. Once you have created a draft outline, relate three aspects of rhetoric to your arguments. First, describe how your arguments collectively relate to the purpose of your paper. For example, how does the argument you made about the importance of the research relate to the purpose of your paper? Second, provide examples of how you will tailor one or more of these arguments to persuade your intended readers. Third, describe how any of the arguments create a space for the new knowledge you are creating with your research study.

- How will you describe the problem your research is addressing?
- Why is your research important?
- What is known about the topic?
- What is not known about the topic (the research gap)?

In addition to the arguments in the CARS model trainees can further expand their repertoire for making different types of persuasive arguments to help them strengthen

their approach. There is an enormous amount of literature on different approaches to making arguments, and much of it is outside the scope of this book. Here, I will briefly touch on three types of arguments that can be used to persuade readers. The logical, emotional, and ethical arguments described below were first explained by Aristotle in the fourth century.[139] His approaches to rhetoric are still relevant for scientific writing today.[134,140]

A logical argument uses logic and reasoning to support a claim.[136,139] For example, in an introduction section, a writer may argue that a pandemic is threatening the health of a certain population and support it with statistics specific to that region (e.g., in the form of a citation). A logical argument in the results section of a paper might claim that disease transmission related to the pandemic is mitigated through wearing masks. A writer might support this claim with data in a figure or table showing relevant data and/or the result of statistical tests.[141] These logical arguments appeal to the reasoning ability of the readers and offer evidence in the form of data or statistics. It's important to note that arguments are routinely made in the health sciences through visuals, such as figures and tables, and not only with words.[142,143]

In scientific journal articles, writers can also make their case by appealing to a reader's emotions.[144] Typically, emotional arguments are presented at the beginning of the introduction section describing the problem that the research addresses. This argument may articulate the suffering and burden that a disease brings, likely causing some discomfort in readers as they understand the problem and the pressing need to address it. This description describes the exigence or need that gave rise to the research,[125] and a person's study addresses this problem, relieving the discomfort.

Ethical arguments relate to building the credibility of an author team to carry out the study.[125,139] The word "ethical" is different from our current understanding of the term; in the original context, it refers to a writer's "ethos," or trustworthiness, and their appeal to moral principles. Such arguments should come across throughout a paper and particularly in the methods section. Through ethical arguments, an author may show their study team is competent and fair, and that they are aware of other research in their topic area. An example is when a team of investigators uses high-quality methods to carry out their study. This argument can be made by thoroughly describing a particular method, explaining why that method was chosen, and further justifying the approach with citations that show the method to be valid and/or reliable.

Helping trainees recognize and leverage these three persuasive approaches can support them in becoming more persuasive writers and more critical consumers of scientific research. Box 3.3 presents questions that help guide newer writers in identifying less obvious arguments about credibility. A mentor text should be used for this activity.

Box 3.3. Activity Idea: Help Writers Identify Textual and Non-Textual Strategies to Persuade Readers That a Study Is of High Quality

Identify the below features in your mentor text and reflect on whether each contributes to greater or less credibility of the study and author team. This is an informal writing activity; respond to each prompt in just a sentence or two.

- How recent are the citations in the introduction section? Did the authors seem aware of recent literature on the topic? Did they acknowledge landmark studies in the area?

- Does the methods text give the impression the study was conducted with careful, high-quality approaches? Or did you have concerns about quality as you read? What features of the text inspired these impressions (list one or two examples that shaped your opinion)?
- Review the funding and conflict of interest statements (usually at the end of articles). Do the authors have any notable conflicts that cause concern about conscious or unconscious bias?
- Review the author affiliations. Does the author team have the expertise needed to competently carry out the study?
- Do you notice other features of the text or article that sway your opinion of the authors or study's credibility? If so, briefly summarize them.

Connected to an author's credibility, and also to their ability to reach their readership, is the command they have of academic and disciplinary language and conventions. Swales and others point to communities[3] with common interests and goals that share specific types of communication styles and language used to make arguments for a targeted readership.[52,117] The ability to effectively reach a given disciplinary community using disciplinary language and academic conventions is a hallmark of developing an academic and disciplinary identity.[115] Helping your trainee learn vocabulary or other conventional means of disciplinary discourse will help them move closer to such an identity.[145]

Anticipating How Readers Will Respond to Arguments to Be More Persuasive

[3] Swales refers to these as "discourse communities."[117]

One limitation of the scientific article format is that it is largely unidirectional, unlike in-person presentations such as oral or poster presentations. A key aspect of making successful arguments that reach the intended readership is anticipating and addressing their counterarguments.[3,125,130,134] The more vividly trainees can imagine their readers, the better they can envision the readers actively responding to their text.[125] For example, overexplaining background information like definitions or underexplaining important concepts can turn readers away.

To help trainees gain depth in understanding their readers, you may ask them to consider adapting questions from Anthony Paré's scholarship, *Thinking Rhetorically, A Pragmatic Approach to Texts*.[125] He asked his students whether their readers might be surprised, offended, challenged, or confirmed by their analysis of the problem they have identified. He inquired of them whether readers would find their methodological approach familiar or new. Finally, he asked whether readers would agree with their approach and, if not, where are the readers likely to disagree.

It is helpful for writers to show their readers they understand potential objections to their arguments and provide counterarguments to address doubts that may arise.[146] Ultimately, this approach will strengthen writers' arguments.[3,125,130,134] For example, acknowledging and then defending a study's potential limitations is a way of addressing potential reader concerns. For example, if a study had substantial missing data on the post-test after an intervention, investigators could compare important characteristics in the pre- and post-sample, demonstrating that the missing data did not result in biased results.

Leveraging Metadiscourse Markers to Persuade Readers

Metadiscourse markers are key language choices that help writers convey a range of meanings.[44,116] These words or phrases can be used to guide readers, convey authority, persuade, or soften a claim. As rhetorical tools, they help add nuanced information and negotiate meaning with readers.[116] Two examples of such markers include hedges and boosters.[3,44]

Both hedges and boosters convey content as well as a writer's stance toward that content and their readers.[3] Hedges are used to soften a writer's commitment to a statement.[3,44,125] A hedge, such as "possibly," "may," or "could," signal that the evidence for a claim is not strong. A familiar phrase used in the discussion section of a scientific paper is that a result "suggests that" risk factor X is related to Y in the broader population. In addition to conveying uncertainty, the statement adheres to academic norms of avoiding overinterpretation from the results of a study. Depending on the study design, sample size, and other factors, this statement could be further crafted to convey a more nuanced amount of uncertainty (for example "This result may suggest that…" or "This result strongly suggests that…"). Thus, hedges both temper a claim and convey a writer's stance toward the claim. Finally, as Ken Hyland stated in his article on the topic, such mechanisms "open a discursive space" for readers to dispute a claim.[147] That is, in addition to conveying a writer's own stance toward a claim, they are also anticipating how the hedged claim may impact a reader's response.[147] In other words, a writer must recognize that they cannot convince readers simply by *stating* a claim; every textual argument is negotiated because it depends on how a reader receives, interprets, and judges that claim.[44,125,147]

Writers use boosters, like "clearly" or "undoubtedly," to convey certainty about their claim and, like hedges, they are used to negotiate meaning with readers.[44,125,147] Unlike hedges, boosters create solidarity with a readership, fostering a sense of shared information and group identity, but they limit the space for a reader to negotiate the claim's meaning.

Helping trainees notice these devices and practice using them will support them in learning academic and disciplinary ways of communicating, particularly for second-language speakers.[6,23,24] But it takes time for academic newcomers to learn to leverage this type of language.[6,48] For example, according to Anthony Paré[125] (p. 228), students' tentativeness may be apparent in the way they write their claims:

> Feeling the need for certainty, but uneasy about the risk of exposure that textual presence brings, students sometimes resort to broad, unattributed claims ('Many people are dissatisfied with current . . .') or claims in the passive voice ('It is widely known that . . .'). Similarly, they either boost their own claims well past a point justified by their data ('This is irrefutable proof that . . .') or hedge them into insignificance to avoid sounding brash ('This might imply a possible trend . . .').

An explicit approach to providing feedback can help such students and other trainees recognize the problems with overstating or under supporting claims, what types of claims are acceptable in their discipline, and suggested wording to help them understand disciplinary-appropriate ways of hedging or boosting.[46]

Genres Embody Rhetoric

A closing point in this chapter is a concept that will continue to be developed throughout the book: genres. Many people are familiar with the term genre as a category of movies or books (e.g., horror, romance, comedy). However, the term may not be in the typical professional lexicon of scientists. That said, genres play a central role in scientific

communication. A superficial definition in this context is a document type, such as a curriculum vitae (CV), a grant proposal, or academic journal article. However, while genres do describe categories of documents, the concept of genre is much deeper and has a richer context than this definition implies.

Though genres have been defined differently by different scholars, a genre can be thought of as a response to a recurring social situation that helps us navigate that situation.[148] It provides a format and conventions for a specific type of social interaction. For example, CVs help us navigate a recurring situation—a job interview—and they contain features and language that are recognizable to those in the academic community who use them; for example, academics know to look for a person's educational background at the top of a CV. In fact, outside academic settings, the term curriculum vitae or its abbreviation may not be recognizable. CVs can be considered a sort of short cut to what would otherwise be a very long, unwieldy conversation in which a job candidate must describe all the papers she has published and all the classes she has taught. A key point about this notion of genres is that each document type is embedded in a particular social situation[112,135,148]—in this case, a job interview—reflecting once again the idea that writing is a social activity.

The scientific journal article is considered its own genre. This genre is used by scientists to: achieve a purpose, persuade readers, and create new knowledge. They embody the rhetorical moves that are expected in such publications, placing a study in the context of research that came before it and suggesting new directions to extend the work. The genre of a scientific journal article uses conventions that are recognizable to other scientists such as the use of standard IMRaD format (introduction, methods, results, and

discussion), the use of tables and figures, citations to support claims, as well as many others.[112,135] In this genre, we see disciplinary language and conventions reflected, bringing together the community of writers and their readers that Swales referred to as discourse communities. Such communities share goals, communication mechanisms, a way to exchange information, writing formats, and language and terminology specific to that community.[117] Participation in these groups educates trainees on the norms and conventions around language use, writing style, collaboration, publication, and other key skills.[6]

Scientific communication is completely reliant upon rhetoric and the genre of the scientific journal article. Rhetoric shapes how we achieve a purpose with our publication, it helps us persuade readers about the importance and need for our work, and it also enables us to move science forward by contributing new knowledge. Being explicit about the use of rhetoric and genres in writing should be a core part of a pedagogical approach to teaching.

Related Open-Access Resources

- WAC Clearinghouse

Instruction Planning Ideas

- Review your teaching or mentoring materials and consider how much focus you include on teaching your trainees to create effective arguments. Do you feel there is room to add additional training material in this area? If so, draw from this chapter to supplement your teaching or mentoring in the areas in which you feel you can make an impact.

Chapter 4: Supporting Diverse Needs, Backgrounds, and Experiences With Your Writing Instruction

Challenges in Working With Diverse Writers

Though research has shown the benefits of diversity in terms of problem solving, high-quality work, and other outcomes,[149–151] it can be challenging to teach to a diverse group of writers. This chapter provides guidance on strategies for meeting the needs of two important groups of trainees: second language speakers and neurodiverse writers. Chapter 11 will further address working with writers who have a range of backgrounds and experiences such as cultural identities and race, gender and sexual orientation, personalities, and working styles.

Many of our classrooms and labs include a variety of learners, in terms of their prior experience and writing training.[154] For example, a typical classroom or lab likely includes second language speakers[23,24,155] and neurodiverse trainees,[25] who may include those with ADHD,[25] dyslexia,[156] or those on the autism spectrum.[157]

In the upcoming sections, I share common challenges and strengths of these two important groups of learners. First, I discuss second language speakers, highlighting key challenges and strengths, as well as specific recommended teaching and mentoring approaches. Second, I characterize different types of neurodiverse writers. The chapter ends with a description of universal design for learning, which is recommended for teaching all trainees—including second language speakers and neurodiverse trainees.

Working With Second Language Speakers

Many instructors and mentors in the health sciences work with second language speakers; in the United States, for example, they comprise a sizable portion of the

graduate students and post-doctoral research fellows.[35] There is a broad literature on working with second language speakers from different areas of research such as English for academic purposes, English as a second language, teaching English to speakers of foreign languages, and others. Although this book is written for a geographically diverse readership, much of the literature and recommendations included below come from English-speaking countries. Some of this material will feel less relevant for those in settings such as the Middle East-North Africa region, or in trainees from such regions where scholars routinely navigate the nuances of multilingualism and multiculturalism, and terms like "first language" and "second language speaker" do not apply.[158,159] However, some instructors and mentors in the US and elsewhere are second language speakers themselves and may have never been trained in writing or teaching.[14,35] This section may be particularly helpful for such readers.

A common misunderstanding among writing instructors working with second language speakers is that the primary teaching focus should be on grammar and vocabulary.[6,23] Well-meaning instructors sometimes focus on these types of concerns even at the expense of responding to content.[6,87,92,160,161] While scientific writers do need good grammar and vocabulary, primary methods for helping them develop as writers should be the same as for first language speakers: socializing them into academic writing through instruction on making rhetorical arguments and writing in the academic journal article genre[117,135] (see Chapter 3), communities of practice[52] (Chapter 1), peer review[6,23] (Chapter 4), and explicit writing feedback[6,23,24] and publication mentorship[6,51] (chapters 9 and 4, respectively). Research has shown that second language speakers can benefit from

instruction on structural and rhetorical writing approaches to English-language scientific publications regardless of their command of grammar.[117]

Second language speakers will benefit from a range of recommended strategies covered here, including crafting rhetorical arguments with cultural differences in mind, [6,23,162] tailored approaches to peer review and feedback, and guidance about plagiarism.[162,163] In the next few paragraphs, recommended practices and sample activities are provided, but they should be adapted to meet the needs of your setting and trainees.

Instruction on enacting rhetorical moves conventional for scientific journal articles[135] can be especially challenging for those navigating cultural differences, as different cultures have different values and expectations regarding writing.[6,164] For example, the standard move in which an author establishes the research gap requires them to draw attention to themselves as providing a significant contribution to a research area. This move can be difficult for those in certain settings (e.g., Brazil, China, Thailand) where this type of "self-promotion" does not fit with cultural norms.[6]

At the same time, trainees can learn to effectively communicate with their disciplinary community in the genre of the scientific paper with explicit instruction on the structure and conventions of an academic paper.[6,23,116,163] Approaches to carry out this instruction include the use of mentor texts to provide models of good writing, and says/does analyses to help them practice identifying rhetorical moves.[79,82] These approaches are covered in detail in Chapter 2. Another activity that can be helpful to both second language speakers and all trainees in learning rhetorical moves is to ask them to

write the same content in both academic style and popular style;[165] for example, summarizing the content of an article into a brief abstract and a tweet or press release.

One challenge to second language speakers is reading and summarizing scientific literature. Practice will help them improve,[166] allowing them to gain experience and confidence reading, meaning making, and writing. One approach to provide practice is to ask trainees to summarize an article that you don't have time to read (for example, summarizing the main findings and contributions to the literature), articles for their own literature review, or even meeting notes from lab or research group meetings.

Incorporating your second language trainees into peer-review activities is a front-line strategy that leverages the power of social engagement to shape writer development. Chapter 5 provides suggested activities such as discussing writing plans, providing feedback, and reflecting on a revision plan that can be done with a peer.[23,24] Specific challenges those from various cultural backgrounds may face in peer review are: a reluctance to provide critiques to peers, concerns about being too direct, hurting a writer's feelings, or damaging group harmony.[23] Those from different cultures may also be slow to embrace peer feedback and instead focus solely on the value of instructor feedback due to cultural norms about authority.[23] Modeling socially acceptable ways of providing critique can be enormously helpful; wording suggestions such as: "To strengthen your paper, I suggest…" gives a trainee a concrete example to emulate.[23,24] It is also important for second language speaking trainees to interact with a variety of peers so they are exposed to those with different strengths and can receive different types of feedback.[23]

Writing feedback is a critical part of helping writers improve, but the experience for second language speakers can be particularly challenging—even demoralizing. Trainees in the health sciences, for example, have expressed frustration over the difficulty of writing, embarrassment over perceived "bad" writing quality, frustration over a lack of writing guidance from their mentors, and feeling attacked about their writing.[15] But it's not easy for mentors either; they may experience their own frustration about the time commitment required to provide feedback,[15,161] struggles in communicating with their trainees, and their own lack of training in providing effective feedback. In a qualitative study of biomedical trainees and their mentors, mentors shared some frustrations: "Teaching grammar! I am not an English major and this is hard!" and "If it takes too long, I take over."[15]

To address such challenges, the next few paragraphs review recommended feedback approaches for working with second language trainees and offer some sample activities. Power dynamics are also discussed briefly as they can be even more exaggerated in this context.

Three key strategies are highlighted here. First, a primary focus for providing feedback to second language speakers should be on big-picture concerns such as the argument structure, content, organization, and flow—particularly in early drafts.[18,88,98,167] Reviewing the course and/or writing assignment's learning objectives prior to giving feedback can help keep this effort focused on the learning goals. In terms of language errors, these can be noted in later stages of the writing process; furthermore, it's a good idea to give writers a chance to correct some of their own language errors[168,169] and to seek support from resources, such as language labs, or other resources, if

appropriate.[163,164,167] Second, be particularly sensitive to your tone when conveying your comments. A good practice is to place praise at the beginning of your feedback to a writer;[14,23,72,88,164,170] for example, you might focus on a range of the writer's strengths such as ideas, perspectives, or even their contextual knowledge of a particular setting (for example, if they are conducting a research study in their home setting on which they are an expert).[164,170,171] Finally, be judicious in providing comments to avoid overwhelming writers. A good guiding principle is limiting your major comments to 2-4 core concerns.[14,95]

Additional concerns are issues of power and authority structures inherent in educational spaces, which can be particularly pronounced in working with second language speakers from a different cultural background,[21,23] as trainees in this context may be more likely to accept every comment—regardless of level of agreement or comprehension—due to a reluctance of being perceived as asking too many questions, or appearing not appropriately deferential to an authority figure.[21,23] It is important and empowering to share with trainees that they should ask for clarification on comments they do not understand.[97] Working at gauging individual "transmission versus uptake," you can have trainees respond to your feedback to ensure understanding, while at the same time encouraging and enabling learning agency.[21,88,95,97,163] Reflective cover sheets are one approach this trainee response work; more detail about this approach is provided in Chapter 5. Individual conferences to discuss feedback are another approach, which is discussed in Chapter 1.[21,88,163]

Conceptions about the ownership of texts and ideas are complex and represent a particularly challenging area of writing for all trainees; in fact, Rebecca Moore Howard,

an expert in the area of plagiarism, refers to these issues as academic literacies concepts.[172] Making this issue even thornier, notions about these ideas are culturally based and differ across settings.[120,164,173] As discussed in Chapter 2, practices that are considered plagiarism range from incorporating text without appropriately citing a source to "patchwriting," wherein a writer paraphrases with wording that is too close to the original.[124,164,172]

In addition to the challenges that writing in a second language present, different cultural notions of plagiarism may make it more challenging to follow plagiarism guidelines. For example, one scenario from the published literature on the topic is a student incorporating text verbatim into their own out of extreme respect for authority.[120] Though a student in this scenario may have been instructed on plagiarism guidance, they are still faced with a choice to follow their cultural values or follow the standards they have just learned. There is also some evidence showing that plagiarism could result from the lack of confidence a second language speaker may feel in using their own words to paraphrase a text.[164]

It is a good practice to provide trainees opportunities to learn to avoid plagiarism (see Box 4.1 for a sample activity that can be used to help trainees do this; it should be modified to fit your context, including the criteria for plagiarism).[124] Instructors and mentors should expect that it will take some time for second language learners to successfully be able to implement such guidance, and trainees should be given ample opportunities for revision.[124,164]

Box 4.1. Activity Idea: Helping Trainees Practice Avoiding Plagiarism

For each article provided, summarize the research objective, brief methods, and 2-3 main findings *without plagiarizing*. The goal is to paraphrase, i.e. describe the text with your own words. Avoid the two types of plagiarism below.

- Failure to quote: Using the exact language of another person without quotation marks around the text.
- Failure to cite: Failure to cite a source from which information was taken; this can occur whether the writer is paraphrasing source information or using the original words, verbatim.

Neurodiverse Writers

This book uses an inclusive definition of neurodiversity that encompasses "the full range of natural cognitive variations that lead to diverse ways of being, thinking, socializing, communicating, and experiencing."[25] It is difficult to estimate the prevalence of such conditions, particularly in light of the breadth of the above definition, geographic variability, and underdiagnosis. Additionally, underreporting by students about their disability to their educational institutions is also quite common, at least in the United States.[174] However, it is likely that instructors and mentors regularly encounter such writers in their professional role.

Writing challenges for neurodiverse students are quite varied. For example, in higher education, some core challenges for dyslexic students are reading, information processing, difficulty summarizing, and spelling.[175,176] With ADHD, writers may struggle with planning, time management, starting a task, distraction, and disorganization in their ideas.[177,178] Whereas students with autism spectrum disorder may struggle with determining the scope of a project or task, difficulty understanding indirect

communication or instruction, and with problem solving.[25,179] Across the groups, in the context of functioning in higher education, mental health and well-being is a continuous challenge.[180]

However, each of these cognitive variations also tends to come with certain strengths. For example, ADHD is associated with divergent thinking and creativity[181,182] and hyperfocus,[183] common strengths in the autism spectrum are excellent pattern identification and visual spatial functioning,[184–186] and there is evidence that those with dyslexia have superior visual spatial abilities.[187]

In addition to the diversity in the strengths and challenges among neurodiverse writers, there is variability within each diagnosis and multiple layers of identity that further make these individuals unique in terms of their needs.[177,180,188]

Supporting Second Language Speakers, Neurodiverse Writers, and Others With Universal Design for Learning

The universal design for learning (UDL) framework, developed by the Center for Applied Special Technology (CAST),[189–191] helps instructors and mentors create learning environments to accommodate neurodiverse writers, second language speakers, as well as a wide range of learners with other needs. The goal is learner agency, fostering the "capacity to actively participate in making choices in the service of learning goals."[192] The framework and guidelines can be used in concert with specific pedagogies for writing.

The UDL guidelines are organized into three principles: engagement, representation, and action and expression.[189] The engagement principle emphasizes that learners bring different identities and motivations to the learning process, emphasizing

the importance of a welcoming orientation. Engaging with learners provides support and structure for their sustained effort and persistence, and offers ways to foster collaboration, collective learning, and belonging. Representation highlights that learners differ in how they "perceive and make meaning from information." This principle encourages instructors to present content in multiple ways, make language and symbols accessible, and foster multiple ways of constructing meaning and building knowledge. The principle of action and expression encourages instructors to optimize access to materials through accessible technologies and tools, to allow for communication in flexible ways, and to support goal setting and strategic navigation of those goals in a variety of ways with multiple options for learners. Each of these three principles is further explained through the description of examples that relate to writing instruction below.

The three UDL sub-guidelines of the engagement principle include: welcoming interests and identities, supporting sustaining effort and persistence, and harnessing the power of emotions and motivation in learning. Sample applications of engagement guidelines are shown in Box 4.2. Notably, peers are considered one of the most helpful resources for graduate-level writing among neurodiverse writers, especially in the context of providing feedback on early drafts that trainees might not want to show their faculty mentor.[25]

Cultivating an emotionally supportive environment is particularly helpful for second language speakers and neurodiverse learners. In some cases, for example, second language speakers may go from being a top student in their country of origin to struggling with the most basic communication.[193] Such individuals may even experience language discrimination and be underestimated by instructors or peers;[194] anxiety or

panic are not uncommon in this group.[195,196] Similarly, neurodiverse learners may face discrimination[197] and are at risk for adverse mental health outcomes.[198] In addition to the below strategies, acknowledging effort, even when a learner does not meet their goal can support them emotionally and in their development as writers.[166]

Box 4.2. Teaching Tip: Sample Applications of the Universal Design for Learning Guidelines *Engagement Principle* for a Writing Project

- Allow learners to choose the topic of their paper, thus welcoming their interests and identities and optimizing learners' choice and autonomy.
- Be explicit about the meaning and purpose of an assignment goal to support sustaining effort and persistence.
- Ask learners to submit their revised draft with a reflective coversheet describing what they felt was the most and least helpful feedback and the 2-3 biggest changes made on the revised draft to promote reflection.
- Encourage learners to engage in social support for writing such as participating in a writing group with peers to provide emotional support and structure and to keep the progress moving forward, while also fostering collaboration, interdependence, and collective learning.

The representation guidelines can be implemented in a variety of ways to support writing. Representation sub-guidelines include: 1) "perception," that is, presenting information in multiple modes and to represent a diversity of perspectives and identities; 2) helping learners navigate language and symbols and to address bias in the use of language and symbols; and 3) supporting the construction of knowledge. Sample applications of the representation guidelines are shown in Box 4.3.

Box 4.3. Teaching Tip: Sample Applications of the Universal Design for Learning Guidelines for the *Representation Principle* for a Writing Project

- Record lectures so that learners can replay them afterward (or if they miss class). Watching a recording allows learners to replay a video at a faster or slower speed, adjusting the information flow to their own needs.
- Present mentor texts from different cultures, not just the dominant culture, to represent a diversity of perspectives.
- Explicitly teach disciplinary language conventions and jargon so that learners understand how to be effective in writing in their context.
- Allow learners to complete informal, low stakes writing in any language they choose, demonstrating respect for a range of languages and to allow for a range of learning modes.
- Emphasize the expertise that learners from other cultures and geographic settings bring to discussions of health and disease and specific regions to connect prior knowledge to new knowledge.

The action and expression guidelines encourage use of accessible materials and tools and assistive technologies; being flexible with forms and expressions of communications; and strategically planning and organizing work. Box 4.4 offers sample applications of these guidelines in the context of a writing project.

Box 4.4. Teaching Tip: Sample Applications of the Universal Design for Learning Guidelines for the *Action and Expression Principle* for a Writing Project

- Allow learners to compose with a keyboard on a computer or use voice dictation to compose for accessibility and to allow different options for

expression and communication (see mind to paper technique described in Chapter 12).

- Provide different options for engaging in the writing process; for example, to plan writing, learners may choose their own brainstorming technique such as freewriting; outlining; developing visuals such as figures and tables; or discussion with a peer (refer to Chapter 5 for more on these approaches). This approach provides flexibility in expression and supports writers in strategically developing their writing.
- During the revision stage, trainees may consider input from a generative AI technology such as ChatGPT and/or peer discussions, providing a range of options for interaction and communication.

Writers and learners are diverse. Following the UDL guidelines and integrating them with recommended writing pedagogical approaches will help you support your trainees with a range of flexible options to succeed. These can be seamlessly woven in with recommended strategies to teach writing.

Related Open-Access Resources

- Writing centers often provide free, high-quality resources for teaching second language speakers. The University of Michigan Sweetland Center for Writing is an example of a writing center with helpful resources in this area.
- Some scientific writing programs have made their materials publicly available on the web. One such website is the Scientific Communication Advances Research Excellence (SCOARE), which provides excellent teaching and mentoring materials for scientific writing.

- The Universal Design for Learning Guidelines by CAST website is an excellent resource for learning more about Universal Design for Learning.

Instruction Planning Ideas

- Choose one activity or assignment that you use with trainees and identify whether there might be a need to provide additional flexibility to allow your trainees to complete it using Universal Design for Learning guidelines and/or principles.

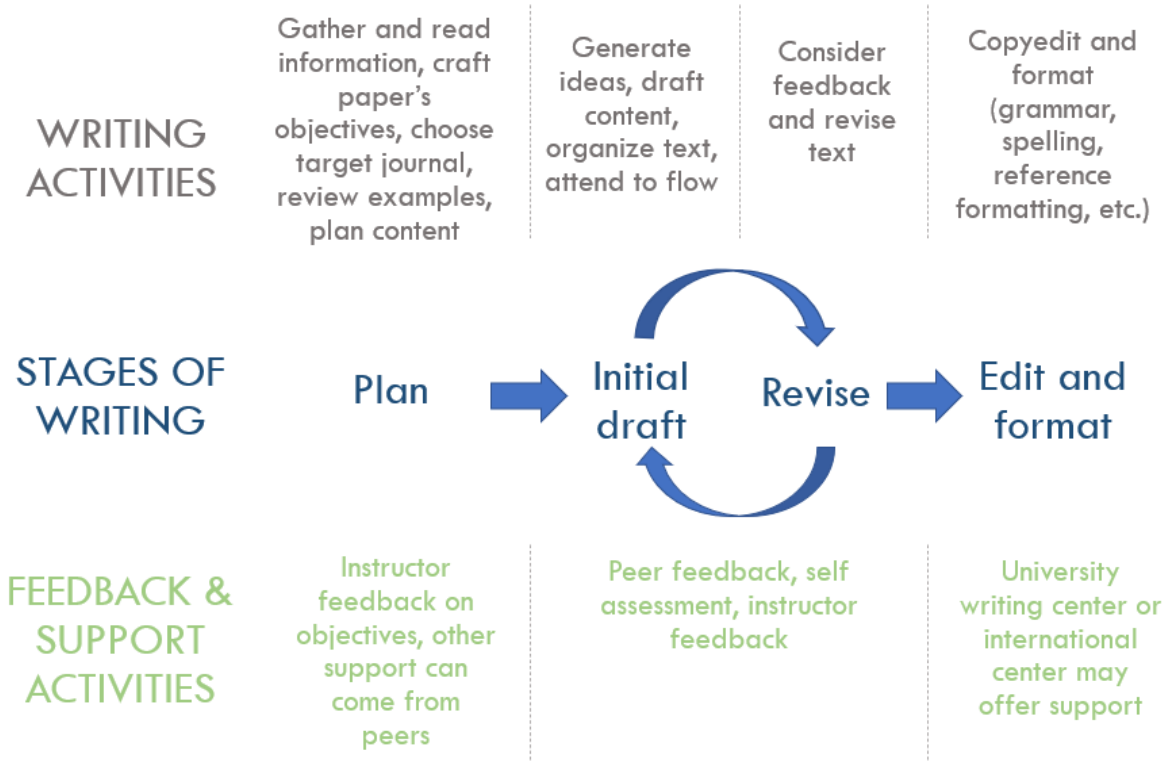
Chapter 5: Honoring the Writing Process: Staging Assignments and Supporting Writing to Maximize Impact and Manage the Workload

The first four chapters addressed foundational themes in writing instruction: socializing your trainees, reading and source use, rhetoric, and supporting the needs of diverse writers, particularly second language speakers and neurodiverse writers. This chapter describes stages of the writing process, and helps you consider how to support your trainees with activities and assignments that build across each stage. The goal is to help your trainees have structure and support in developing their writing without overwhelming you with work.

Writing a research paper is an iterative process during which trainees, in particular, require support and feedback at multiple stages (Figure 5.1).[98,199–202] This chapter offers advice on how to support aspects of the writing process from beginning to end, incorporating recommended practices on providing structure for deep reading and source use, choosing a topic, process and content planning, choosing a target journal and readership, initial draft, feedback, revision, the final paper, and reflective evaluation.

It is aimed at mentors who may be guiding advisees, fellows, lab groups, or others in developing research papers, as well as instructors teaching a writing course or assigning a paper in a content-oriented course (as opposed to a writing instruction course). Some advice may be more relevant to mentoring or teaching, but much of the advice will apply to a range of contexts.

Figure 5.1. Stages of Writing, Writing Activities at Each Stage, and Feedback and Support Activities for Each Stage



You may decide not to incorporate all of the suggestions in this chapter into your teaching practice, particularly if you are assigning a paper in a content-oriented class, which offers less room for writing instruction. After reading this chapter, however, you will be familiar with a range of options from which to create your approach to writing instruction. This chapter includes multiple example assignments and activities with an overarching focus on supporting trainees through a staged writing process; however, additional activities and assignments are provided in other areas of the book (e.g.,

Chapter 2 on reading and Chapter 3 on rhetoric). None of the material is prescriptive and you will need to select what works best in your setting.

Supporting Writers Through a Staged Writing Process

Writers should be guided to iteratively develop their papers through a staged writing process.[98,199] This approach allows trainees to build their papers progressively with feedback along the way. This may sound daunting to a busy instructor or mentor, but keep in mind that the feedback does not need to come exclusively from you.[203] For example, as a course instructor, you could provide brief guidance on a paper's objectives early on to make sure writers start off on the right foot. Then you may require the writers' first drafts to be reviewed by peers during class time before turning in their revised drafts to the instructor.

Writing experts emphasize shifting your time investment to early drafts, as trainees benefit most from feedback at this stage (see Box 5.1 for tips to avoid this and other common pitfalls).[98] You can also take advantage of self-assessment and peer review, which save you time and benefit trainees (both writers and peer reviewers) in multiple ways.[199,203–205]

Box 5.1. Teaching Tip: Avoiding Common Pitfalls in Mentoring or Teaching Writing

There is no one "right" way to support your trainees' writing, but avoiding three common pitfalls will help you save time and help trainees in creating a better product, The pitfalls below are a result of a misalignment between writing mentorship or instruction and the staged writing process.

1) Avoid asking your trainees to write a paper with no guidance or support during the development process, as this may result in a final product that misses the mark. [98]
2) Avoid investing hours writing comments on papers at the end of the semester.[88,95] Trainees cannot meaningfully learn from these comments. Why? Imagine teaching a trainee to paint a picture by providing advice about how they *should have done* it after they finished rather than offering hands-on instruction along the way. The trainee would not learn nearly as much. First, providing feedback on a "finished product" denies trainees the opportunity to apply the feedback to revise—an essential writing skill. Second, trainees may never read the feedback. Instead, shift your efforts to earlier in the process. If you only have time to give feedback once during a course, do it on an initial draft and require students to revise in response to this feedback.
3) Avoid commenting on details such as style, grammar, and mechanics in early drafts.[87,92] This is inefficient for both writer and instructor or mentor because large sections of text may be rearranged or deleted as the writer works through their ideas, organization, and flow. Creating a polished product free of grammar and spelling errors is important, but that work should come later in the writing process.

Providing Structure for Deep Reading and Good Source Use

This section builds on the material from the previous chapter on reading and offers an example homework assignment that requires trainees to closely read and annotate five key articles. The assignment idea in Box 5.2can help trainees deepen their reading and source use skills and build good habits.[103]

Box 5.2. Assignment Idea: Annotate Five Key Articles

- Instructions: Using the annotation format you chose previously, annotate five key readings (enter information into the form you created for this purpose). Include only high-quality sources as discussed in class. Avoid pasting text from the article directly to the spreadsheet. Instead, summarize information in your own words.
- Complete prior to starting assignment: You should have identified your preferred annotation format and created a shell (e.g., in a spreadsheet) for your annotations.
- Learning objectives: Through annotating key articles, identify important information you may want to include in your paper. The notes in your annotation document are a first step in writing your draft. You will go back and review these notes when writing, deciding whether the information is relevant to your paper, and you will also synthesize it with information from the other sources. Including only high-quality sources will shape the quality of your citations; high-quality citations are more persuasive in supporting arguments. Finally, summarizing the information rather than pasting text directly from your sources will help you be more mindful when processing the information and avoid accidentally plagiarizing during the writing stage.
- Purpose of the writing: To summarize and reflect on information from your key readings.
- Intended readers: You.
- Length: No specific length requirements.

Encouraging Inclusive Citation Practices

When training your students and mentees on source use, consider highlighting inclusive citation practices, which involves reading and citing the scholarship of authors with a range of backgrounds, experiences, and perspectives rather than only including highly recognized and well-cited authors.[206,207] This practice counterbalances inequities in citation, as women are cited less frequently than men[208,209] and authors from low-income countries are cited less frequently than their high-income country counterparts.[210] Because citation counts are important to professional advancement and opportunities, this practice has the potential to counterbalance inequities in this realm.[206,210]

When discussing inclusive citation, it's important to emphasize some nuances to help students appreciate the complexities involved in this practice. Three such nuances are reviewed here. First, tokenism should be avoided.[207,211] Trainees should not cite work simply because it is the scholarship of someone from an underrepresented group. The sources that trainees cite should be of high quality and should enhance their own scholarship.[206] Second, make clear to your trainees that the scholarship of underrepresented groups will not necessarily align with these scholars' identities.[207,212] That is, while some underrepresented groups will conduct research on topics and populations that relate to their identities, this research is diverse because the members are diverse.[212] Third, members of a particular group do not necessarily represent or speak for that group. Every researcher has their own unique scholarly identity.[207,212] Box 5.3 offers reflective questions that you can use to plan an activity with your trainees. These questions encourage writers to consider who they may want to cite and why.

Box 5.3. Activity Idea: Ask Trainees to Consider Reflective Questions About Citation Practices (adapted from the Rowan University Cambell Library guide on inclusive citation)[207]

- As you develop strategies for finding sources, consider the following questions:
    - What voices could or should be included in your research?
    - Are you looking at a particular community or geographic region? If so, do you have sources from or about that community or region?
    - Are certain groups particularly affected by the topic you're discussing? If so, do you have sources from or about those groups?
    - As you review your citations, consider the authors you included in your research. Do you know what their relationship to the topic is? Does your collection of authors represent a range of voices and perspectives relevant to the topic? Reflecting on this might include considering:
        - where the authors are from
        - aspects of their identity or positionality that may relate to the topic (e.g., gender, race, ethnicity, nationality, age, disability)
        - their perspective(s) on or interest(s) in the topic

Supporting Writers in Choosing an Appropriate Topic

Incorporating literature searches, reading, and article annotations into assignments and activities will send the signal to trainees that these activities are crucial to choosing a topic and a key part of the writing process.[199] A good support for students to generate

topic ideas is creating a list, and this activity can be particularly helpful when paired with reading.[213–216] Students can be guided to read articles on their topic area of interest (e.g., breast cancer screening programs in low-resource settings) and asked to keep a list of interesting questions that arise during their reading to help them develop a research objective. They can be guided to pay special attention to the end of articles where a paper describes next steps as these may prove to be fruitful topics.

Finally, review each student's or mentee's topic early on to make sure it is appropriate in scope and complexity.[98,199] This can be accomplished through discussion in a brief (5-10 minute) meeting or through evaluating a written description (e.g., a paper proposal).[96,98,199] Box 5.4 presents a modifiable assignment idea to support a trainee in developing their research objectives; provide feedback in writing or through a brief meeting, as appropriate.

Box 5.4. Assignment Idea: Drafting Research Objectives for Approval

- Instructions: Draft 1-2 objectives for your paper that address a knowledge gap in the published literature. I will review and provide feedback on your objectives and will request a meeting with you to discuss them if I feel it would be beneficial to your progress.
- Complete prior to starting assignment: You should have read and annotated key articles. As you finalize your research objectives, you will need to select a target journal, review the readership on the journal's web page, and review example mentor texts from this journal on a similar topic.
- Learning objectives: Write clear and testable objectives for your review paper; these objectives will be the foundation for your paper.

- Purpose of the writing: To help readers understand the purpose of the study you describe in your paper.
- Intended readers: The core readership of your target journal (you may need to go back and fine tune this after finalizing your target journal).
- Length: Approximately 1-3 sentences in total.

Helping Your Trainees Plan the Process in Writing Their Papers

Trainees benefit from planning how they will complete a writing task, as well as planning the content of their writing.[199] Process planning is helpful because it requires a trainee to reflect on and regulate their own learning. One aspect of self-regulated learning is metacognition, sometimes referred to as "thinking about thinking."[217] This type of reflection occurs when a person separates from an activity, steps back, and gets perspective on it through viewing it with fresh eyes.[12,218] Metacognitive awareness helps writers be more thoughtful about their process and product through a cycle of planning, monitoring, and evaluating their writing. Goal setting and planning strategies have also been associated with greater writing proficiency,[219] and it is true that more skilled writers spend more time on this foundational work and engage in a variety of strategies to plan their work.[220]

To engage in the process planning stage, a writer can be encouraged to reflect on a range of activities, including, for example, the requirements and components of the project (what a writing assignment is asking them to do), what is needed to carry out the project (such as information gathering and reading), setting micro-goals for carrying out the work (e.g., creating weekly progress targets), identifying good writing examples to follow (mentor texts), how to organize the work (the creation of annotations and/or a

progress log), finding a good setting (favorite coffee shop) and schedule for working, rewarding one's self for meeting targets, as well as plans for revision, monitoring progress, and evaluating the work.[221]

Of course, some of the above strategies may already be part of the structure of your class or program and, therefore, may not need to be the focus of student planning per se. For example, if there are already separate assignments for an initial draft and a revised draft, then students can focus on a subset of planning activities to accomplish each separately.

Process planning does not have to be a separate assignment and does not even need to be turned in or graded. Keeping in mind that reflection can be particularly effective when it's social,[6,52] consider providing opportunities for trainees to share their process planning with peers. One option is to provide the opportunity for trainees to first gather their thoughts through informal writing and then ask them to share and get feedback on their plans in pairs or groups. That said, it's a good idea to mention to trainees that if points of confusion arise during the planning process, they should ask for instructor or mentor clarification.

One final point about process planning is that research has consistently shown writing self-efficacy plays an important role in contributing to use of self-regulation strategies and writing proficiency.[219,220] Encouraging writers to plan their process and providing mentor texts for additional guidance can be an effective way to help writers gain self-efficacy in this area.[222] Box 5.5 offers a sample activity to help writers plan their writing assignment or project.

Box 5.5 Activity Idea: Encourage Trainees to Plan Their Process

As your trainees begin a writing project, ask them to consider one or more of the below prompts to help them plan their work and process:

- paraphrase the purpose of the writing and/or assignment
- identify what the assignment or writing type requires such as the knowledge, skills, time, and other resources needed to organize and carry out the project
- identify what steps, tasks, or processes are needed to engage in to complete the project
- identify any points of confusion requiring clarification
- create a plan to complete the work that incorporates a schedule for meeting micro-goals (e.g., meeting weekly progress targets)

Helping Trainees Plan and Organize the Content of Their Papers

Consider incorporating other planning activities into your classes or mentee meetings to help trainees to sort their ideas and organize their arguments.[220] Again, not all activities require grades or instructor feedback. Brainstorming is an unstructured way of opening up and exploring a topic and thinking through content and approach for an upcoming writing project, which helps writers generate ideas and arguments and build the initial structure for their paper.[214]

Outlines are one brainstorming technique that can help writers plan content, but they can be limited in their ability to support exploration of complex ideas; further, some writing experts say that outlines offer a false expectation that authors think first and then write.[93] A brief partner activity can help writers talk through their outlines to expand on

ideas about what content to include and how to organize their papers. A conversation with a peer offers a relaxed but dynamic interaction to explore ideas and get feedback.[223]

Box 5.6 offers a modifiable sample activity asking trainees to create an outline and discuss it with a partner.

Box 5.6. Activity Idea: Create and Discuss a Paper Outline

- Complete an outline to plan the main points of your introduction, methods, results, and/or discussion section.
- Pair up with a partner and share your outline with them. Along with the content you would like to include, explain the motivation for your paper, what you hope to accomplish with it, and the major arguments you plan to make. Additionally, share any sticking points or challenges you're concerned about in moving forward with the paper.

Asking Trainees to Choose (and Write for) a Target Journal, Even if They Do Not Plan to Publish Their Work

Writing experts recommend that you ask students to write in the same document types as those used in their professional workplaces (this point is elaborated in Chapter 7).[41,42,93,112,224–228] This means asking your trainees to write their papers as if they will publish them even if they do not plan to do so.[41,42,93,112,224–228] Asking trainees to choose a peer-reviewed journal (or choosing one for them) and applying the journal's author guidelines to their papers is good training in academic literacies. In addition to enlightening them about how knowledge is generated and disseminated in their field, writing for a target journal positions trainees to write for a defined readership. Asking trainees to write for a particular journal teaches them what is arguably the most important

skill in writing: effectively reaching your intended readers.[3,128] When no readership is identified, students tend to write to the instructor, who students may assume already knows the information they are writing about.[229] When trainees are asked to write to a specific readership, they need to decide what and how much background to provide to help readers understand their papers, and how to make the information relevant and relatable to their readers.[3,128] Mastering the skill of effectively reaching intended readerships will help trainees publish papers, secure grant funding, and advance professionally in numerous other ways.[230]

For courses in which students are working on their own research (or in a mentored lab or research group), asking writers to follow a journal's guidelines for an original research paper may make sense. However, if students are writing a paper that synthesizes research on a given topic, a good option may be to ask them to follow a journal's guidelines for a scoping review paper.

Once a trainee has identified their target journal, they also have the benefit of using the numerous papers published in the journal as examples. Asking them to download 1-2 papers from their target journal that are of the same type as the assignment (e.g., scoping review papers or original research papers) and address similar subject matter to the topic the student has chosen will provide a guide for formatting, length, and style. Encourage your trainees to study these examples to notice different writing styles, and to decide which they want to emulate and any aspects they may want to avoid emulating.[80] Boxes 5.7 and 5.8 present activity ideas, guiding trainees through a process of identifying potential target journals.

Box 5.7. Activity Idea: Make a Short List of Target Journals

- Make a short list of possible target journals for your paper using the three strategies below. Your short list should include approximately 3-4 journals that appeared frequently in the results of these searches.
    1. Enter your keywords into PubMed or other database and include journals that appear multiple times in the results.
    2. Include journals that appear multiple times in your reference list.
    3. Go to JANE (Journal Author Name Estimator) https://jane.biosemantics.org/ and paste your title and/or abstract and click "find journals," and review journals that are a good match.

Box 5.8. Activity Idea: Choose a Target Journal

Once you have a short list (3-4 journals at most), consider the below criteria to make your final selection. Once you have a short list (3-4 journals at most), consider the criteria questions below to make your final selection, which should then lead to a discussion with your mentor regarding your reasoning for the selected journal.

- What is the scope of the journal?
- Is the intended readership aligned with your article's purpose and goals?
- What is the journal's impact factor (if available)?
- What is its percentage of acceptance and is there a publication fee?
- What are the word and table/figure limits for your article category (e.g., original research or review paper)?
- What is the journal's turnaround time (if available)?

Giving Students the Opportunity to Write a First Draft and the Chance to Revise

When assigning the initial draft, be clear that the first product trainees turn in will not be their final product. Below is a sample assignment for an initial draft of the introduction section of a paper. Note that the assignment explicitly refers to the introduction section as an "initial draft." This helps trainees appreciate the staged writing process and can also help them avoid the anxiety that can come with the expectation of perfection early on.[29]

Box 5.9. Assignment Idea: Introduction Section of Initial Draft

- Instructions: Write a complete draft of your introduction section. Be sure you have removed any placeholder text that may have been copied from other sources in the version that you submit for credit; that is, ensure you do not include any plagiarized text in the assignment you turn in.
- Complete prior to starting assignment: Prior to doing this assignment, you should have chosen a target journal and identified the readership, read and annotated key articles, completed prewriting, and reviewed example mentor texts.
- Learning objectives*:* Apply what you have learned about the structure, tone, and style of academic writing to your introduction section draft, and to develop arguments about why your research is important, where the research gap is, and how your study addresses the research gap. Thinking through these arguments on paper helps you improve your critical thinking skills and provides practice for developing all kinds of arguments.
- Purpose of the writing: To summarize and synthesize existing knowledge about your topic and the motivation for your research.

- Intended readers*:* The readers of your target journal (you are not required to publish your findings, but you should write your paper as if you will publish it).
- Length: It should be roughly the same length as your example mentor articles, usually 3-5 paragraphs.

Providing Feedback on Early Drafts to Support Revision and Save Time

The writing process is iterative and inseparable from a writer's thinking about their subject matter. Therefore, it is important to encourage trainees' free flowing engagement with ideas—rather than with technical details—early in the writing process. Share with your trainees that the most important part of writing the first draft of a paper is to keep moving, with the understanding that they will continue to fine tune as their writing progresses.[213] This advice may help your trainees both to fully explore their ideas and to avoid getting too attached to ideas or text they generate in early stages.

Below, I have summarized strategies for providing feedback that are appropriate for the first complete draft of a paper. Detailed advice about giving respectful, specific, and clear feedback is included in Chapter 7.

Give Feedback Appropriate to the Writing (and Thinking) Stage

Writing experts recommend focusing on bigger-picture issues early in the writing process when a writer is shaping their topic and arguments.[200] This focus encourages the type of thinking appropriate to early-stage writing and can save instructors and mentors significant time, which may otherwise be spent bogged down in details that are irrelevant in early stages. Accordingly, your review of trainees' early drafts should focus on big-picture elements like main ideas, organization, logic, and general content. In practice, this

means making big-picture comments on early drafts to help the writer with organization, overall content, and flow. With instruction, trainees can also provide this type of feedback to one another (or they can assess their own writing in this regard).[203,204]

Avoid commenting on details such as style, grammar, and mechanics in an early draft. Focusing on such details early in the development process is inefficient for the writer and instructor or mentor because large sections of text may be rearranged or deleted as the writer works through their ideas, organization, and flow.[87,200,231] Premature focus on these types of details can also actually be detrimental for a writer. It can shut off a writer's thinking process, causing them to lose touch with the big picture.[84] That said, students should be aware that they are expected to turn in a final product free of grammatical and spelling errors. Ideally, any needed instruction on grammar and spelling does not become the job of the content instructor or writing mentor. Finally, be sure to explain to your trainees or mentees that you will be providing feedback in stages to make sure they don't misunderstand the lack of feedback on grammar or spelling to mean that there are no problems in these areas.

Self-Assessment and Peer Feedback Build Metacognitive Awareness and Save Instructor Time

When properly trained, writers can benefit from self-assessment as well as from exchanging feedback with peers. Research has shown that peer review both improves writers' performance and helps them make sustainable improvements in their writing process.[232,233] Similar benefits can be gained from self-assessment.[204] These activities support self-regulated learning as they help trainees monitor their progress.[234] This section offers a description of and ideas for leveraging peer and self-assessment to

support revision, along with evidence supporting these approaches. Self and peer review complement and reinforce instructor feedback and save instructors and mentors' time.

Self-Assessment Encourages Metacognitive Reflection. Self-assessment is helpful to writers in large part because it puts them in a mode of seeing their work with "fresh eyes."[235] This metacognitive mode of reflection—in which writers step back and view their work from a distance—helps them analyze their text, make their own judgments about changes that need to be made, and decide what adjustments are needed in their writing process. This activity helps academic writers build core writing skills with benefits that transfer to other types of writing.[93]

Self-assessment can take a variety of forms. One longstanding format for self-assessment is the "says/does" outline[216,235] in which a reader links content (what the text *says*) with the function within the text (what it *does*, such as establishing what underlying information is already known about a research topic). A says/does outline of a writer's own text helps them to evaluate an early draft, notice what content is included and what might be missing, and get perspective on the flow and organization of their paper.[216,235]

An example of a says/does analysis of a published example journal article is provided in Chapter 2. This approach can also be used by a writer to review their own draft text and will need to be scaffolded with instruction.

Another strategy for helping writers get perspective on their own text is to ask them to read their paper out loud or listen to it being read.[103] This strategy can help writers view their work with fresh eyes and identify organizational issues, areas that are unclear, or other problems themselves.

Peer Feedback Helps the Reviewer and the Writer. Peer feedback saves an instructor or mentor time and has multiple benefits for the reviewer as well as the writer.[201,202,236–238] When properly trained, peer reviewers can actually provide feedback similar to that of instructors[87,239,240] and is especially effective in large courses.[241] In studies, peer reviewers have reported that the process of reviewing their peers' work resulted in reflection on their own writing. In fact, in one study, students who only provided peer feedback but did not receive peer feedback made more significant gains in their writing compared to those who received peer feedback but did not provide it.[232]

Like writing, peer review is a staged writing activity encompassing reading, content planning, and composing, and this is one way to frame the activity to help trainees understand how to complete a high-quality review.[242] In the first step of this process, writers read the entire document they are reviewing to understand it as a whole, taking notes as necessary to help them keep track of initial thoughts. The second step is a comprehensive evaluation of the document, maintaining focus on evaluating rather than making suggestions to the writer. Checklists such as those available in the EQUATOR Network can be helpful during this stage. The third stage is writing the review. The feedback recommendations in this book will be helpful to guide reviewers as they craft their comments.

Though peer feedback can be organized as an at-home assignment, you may decide to have trainees engage in peer feedback sessions during a class or lab meeting. The in-person format allows you to walk trainees through the process and answer questions as they arise, and it alleviates the need for them to schedule time outside of class or lab meeting, which can be challenging. Plan to spend 5-10 minutes teaching

trainees some of the principles offered in this book for feedback on early drafts of a paper: stay focused on the big picture and pay attention to flow, organization, overall content, and clarity. Be sure to provide reviewers a peer review guide (a sample guide is in Box 5.10) to help trainees navigate the process and stay on track.[236,237,243]

Box 5.10. Activity Idea: Ask Your Trainees to Peer Review Each Other's Work. The Sample Peer Review Guide Below May Be Adapted for Reviewing an Introduction Section Draft.

Instructions:

1. Choose a review partner.
2. Meet with your partner briefly and take turns sharing specific concerns you want your partner to focus on in their review (e.g. "Do you think my research objectives are clear enough?", "Can you suggest ways to cut down text without sacrificing key information?"). It is fine if you don't have any specific concerns.
3. Skim the introduction without commenting.
4. Go through the introduction again and provide written feedback according to the Review Guide prompts below.
5. Discuss your comments with the writer after you finish.
6. Don't forget to give your written review comments to your partner (in addition to turning them in to me).

Review Tips:

- Keep all comments as specific and detailed as possible.
- Do not proofread the draft or mark any sentence-level issues such as grammar, spelling, etc. Creating a polished product free of grammar and spelling errors is important, but that work should happen later in the writing process.
- Provide a balance of positive comments and suggestions/areas for improvement.

- Be sure to point out at least two very specific and relevant positive aspects of the product.
- Be sure to make at least two very specific and relevant areas or suggestions for improving the product.
- Note that the writer is not obliged to implement your suggestions.

Review Guide:

Before you provide comments, note the target journal and the writer's research objectives. For each introduction element, comment on whether the author included the element in their draft. If so, was it clear, convincing, and well supported? Add specific suggestions and, where relevant, point out specific areas where the writer did a great job.

Introduction Elements:

- Explains the problem the research addresses
- Describes why you should care about this research; why the research is important (the "so what")
- States what is already known about topic
- Argues what is not known about topic
- Explains why it is important to learn this new information
- Justifies doing research in the specific population or location (if applicable)

Additional Elements:

- Does the introduction provide enough background given the core readership of the target journal?
- Does the introduction address information relevant to the research question?

For example, if the paper aims to evaluate effect modification of a particular relationship, has that been adequately set up/justified in the introduction?

- Is the introduction well organized?
- Additional comments

Some issues can make peer review challenging and I highlight three such challenges here. First, assigning students partners can be problematic if there are compatibility issues between students, and because students may prefer to have the autonomy to choose their partner.[244] Yet the disadvantage of allowing students to choose their own partners is that students with similar skills may pair up, preventing a match that maximizes learning opportunities. One strategy that balances the needs for pairing students strategically with allowing them to have a say in the process is a "skill pairing" approach, wherein students are asked to identify their writing strengths and challenges early in the semester and the instructor pairs them based on those assessments.[245]

Second, some students don't attend in-person peer review due to illness or other circumstances. This can be addressed prior to the peer review session, asking students to notify you and their partner if they are unable to attend the session. Students can make an alternate plan for completing the work and communicate this plan to you. If a student is unable to find a paper to review, they may review a published paper. ChatGPT can stand in as a peer reviewer if the student was unable to find a peer reviewer (see Chapter 6 for a ChatGPT peer review activity).[246]

Third, although most students enjoy peer review, some may struggle to come up with suggestions for their peers.[93,236] When introducing the peer review activity, it can be helpful to emphasize the benefits of providing feedback. This helps writers who may not

have received comprehensive feedback to understand they are still benefiting from peer review.[232] Using a structured form with prompts is a key support that helps students identify both suggestions and praise.

Revision With Coversheet

Reflective cover sheets encourage writers to get into a metacognitive mode of thought that helps them learn to evaluate and manage their own writing process.[217] These are also considered monitoring activities that support self-regulated learning.[234] For instructors or mentors, reading coversheets provides insights into where writers are in the development process, such as by illustrating what a writer might be missing, misunderstanding, or need additional support on. It is important to keep these coversheets short so that writers don't feel bogged down and so that instructors or mentors don't find them a burden to read.[84] See Box 5.11 for a sample assignment for a revised paper that requires a cover sheet.

Box 5.11. Assignment Idea: Final Revised Paper With Reflective Coversheet

Part 1: Revised Paper

- Instructions: Building on feedback from me, your peer, and your own reflections, revise and collate each section of the paper so that it includes a title, abstract, introduction, methods, results, discussion, and references. Follow the author formatting guidelines for your target journal. Include a title page and format it according to the journal's guidelines. You should be sole author on this paper. This product should be polished and free of spelling and grammar errors.

- Complete prior to starting assignment: Review feedback on initial drafts from me and your peers. Ask for clarification if you do not understand any of the feedback. Review your own notes from your self-review.
- Learning objectives*:* To apply strategies for revising your paper, to write a professional academic journal article that is tailored to your target journal's core readership.
- Purpose of the writing: To address the research objectives you posed and share your research with the academic community.
- Intended readers*:* The core readership of your target journal (you are not required to publish your findings, but you should write your paper as if you will publish it).
- Length: Follow the word count for your target journal (if there is no maximum word limit, limit your paper to 3000 words exclusive of tables, figures, references, and the abstract and include no more than five tables and figures).

Part 2: Reflective Cover Sheet

- Instructions: Submit a short cover sheet describing (a) which comments from your peer were most helpful (if none of them were helpful, please give two examples and explain why each was not helpful); (b) the biggest substantive changes you made in this version (do not include editing changes like spelling, grammar, etc.) AND how you think these changes improved your paper.
- Complete prior to starting assignment: Your revision.

- Learning objectives: To apply strategies that enhance your writing process and apply critical thinking skills by reflecting on the decisions and process that supported your revision.
- Purpose of the writing: To help you to reflect on your writing process, what is helpful, and what strategies might be useful in the future.
- Intended readers: You and me (your instructor).

Approaching the Final Paper Based on Prior Feedback and Assessment

If you have already given feedback on the writer's first draft, your time investment in commenting on the final draft should be minimal:[199] for example, a grade and brief comment about the overall progress or quality of the paper. If you did not provide feedback on the first draft (e.g., it was only provided by peers and/or through self-assessment), then you may spend more time evaluating the final product. You may decide to evaluate papers based on criteria that define a high-quality paper, on the student's responsiveness to feedback and improvement since the initial draft, or both.[247,248]

Box 5.12. Teaching Tip: Time-Saving Strategies for Organizing Writing Assignments and Providing Feedback

- Incorporate self-review and/or peer review because they save time and benefit writers and reviewers.
- For instructors and mentors working in higher education, learn what resources are available to support writing; for example, writing centers, professional development resources, and dedicated support for second language writers may be available.

- Consider assigning collaborative writing, which has multiple benefits for students and can save instructors time because there are fewer assignments on which to provide feedback and grades (See Chapter 8 for more on collaborative writing).

Planning and monitoring activities that support self-regulated learning were covered in this chapter; they help trainees monitor their progress.[234] Evaluation activities that support self-regulated learning encourage writers to consider which strategies, tools, resources, and/or processes served them well, what they learned along the way, and what strategies might help them in the future; for example, talking to a peer about written feedback that may be helpful to apply in future writing projects.[12,218] Evaluation activities can be incorporated at the end of a class or program (see sample activity in Box 5.13) to encourage writers to reflect upon their learning and how their growth as a writer might extend to future writing.

Box 5.13. Activity Idea: Incorporate Reflection Into the Evaluation Stage of Writing

Describe new skills for future writing. Ask your trainees to gather in small groups and share one writing skill they learned while working on the assignment and explain how they could apply that skill in their next writing project to make the writing easier, more effective, or more efficient. After sharing in small groups, one or two people from each group can share to the larger group.

Related Open-Access Resources

- August E, Brouwer A. How to Write an Effective Journal Peer Review Using a Staged Writing Approach: A Best-Practice Guide for Early-Career Researchers.

International Journal of Epidemiology. 2024; 53(6). https://doi.org/10.1093/ije/dyae154.

- JANE (Journal Author Name Estimator) is a resource to help authors choose potential target journals.

Instruction Planning Ideas

- Reconsider your approach to giving writing feedback and whether you and your trainees might benefit from modifying your approach. For example, if you have been providing writing feedback only on the final paper, might shifting your efforts to an earlier draft support trainees in more meaningful learning from your comments? Would this be worth the time investment of having trainees submit an initial draft and also managing a revision with your comments incorporated?
- Consider whether any strategies in this chapter might support your trainees in submitting work that is better in quality than you have tended to receive in the past. For example, might asking trainees to complete a self-review and/or peer review (or implementing other strategies presented) prior to submitting their initial draft to you improve the quality? Would you have room in your course curriculum for trainees to complete these activities during class? Would it be feasible to include them as homework assignments?

Chapter 6: Planning a Course or Workshop on Scientific Writing

Chapter 5 laid a foundation for considering all stages of the writing process while supporting trainees. Building on this concept of writing, this chapter offers principles for planning and delivering writing instruction. The material is targeted to classroom instructors as well as those planning a publication workshop or short course on writing. The chapter begins with advice for designing courses and workshops and ends with a sample course curriculum and workshop agendas.

Designing Your Course or Workshop "Backward."

Supporting writers in improving their skills through a course or workshop requires careful planning. The best place to begin is by thinking through your desired results. Once you are clear on your goals, you can develop content to take you there: this is the concept of backward design.[76]

Backward design is an intentional way of supporting trainees in developing their writing skills because you are choosing the topics, activities, and assignments to support your goals-- rather than allowing your goals to be defined as a culmination of the materials you covered along the way. Below I have provided an overview of three steps to design your course or workshop backwards. This section is based on the work of Wiggins and McTighe.[76]

Step 1: Identify What the Learners Should Know and Be Able to Do by the End of the Course or Workshop.

Intended outcomes for a course or workshop may include knowledge and/or skills. The key to setting up a strong foundation for building your instructional design is being as clear and specific as possible in describing your goals. Table 6.1 provides an

example goal for a graduate-level scientific writing course and another example goal for a publication workshop. If these seem fairly narrow, they are. In practice, you will set multiple goals, but each should be specific. Notice that the course and workshop goals, respectively, are linked to rhetorical and metacognitive skills. These are important considerations when identifying goals related to writing.

Table 6.1. Step 1: Sample Goals for a Course or Workshop	
Graduate Scientific Writing Course	Publication Workshop
Goal: Students will be able to effectively respond to feedback with revisions as an important part of the writing process (a metacognition skill).	Goal: Participants will be able to tailor writing to their intended readers (a rhetorical skill).

When crafting the goals of your course or workshop, consider the experience level and goals of the writers as well as your setting (such as a graduate course versus a workshop for government employees). Start with the big picture and then identify specific goals to help writers achieve them. To illustrate, an instructor of a graduate course may ask students to learn the conventions of scientific writing (style, tone, etc.), understand the basic structure of a journal article, understand the roles and ethics of authorship, and gain skills such as how to use a citation manager.

Whereas a workshop leader may, on the other hand, set a goal that participants be able to write a publishable paper by the end of the workshop. And while this is a worthy and reasonable goal, it is comprised of many complex tasks that need to be broken down into specific skills, each with their own benchmark and training component. For example,

if the writers already have a basic understanding of the structure of a scientific article, the trainer may set goals of learning how to identify an appropriate target journal, crafting effective arguments, adjusting the writing to the intended readers, effectively visualizing data, or building other skills.

Step 2: Define Evidence of Success and Then Design Your Assessment(s) to Capture That Evidence.

Decide what evidence will show that students or participants have reached the goals you set. What do they need to do to demonstrate the learning you want for them? Building on the desired evidence, design the specific tasks and assignments that will allow writers to demonstrate their knowledge and skills. Table 6.2 describes the sample evidence showing that students can effectively respond to reviewer comments with their revisions and that publication workshop participants have learned to tailor their writing to their intended readership (i.e., the sample goals presented in Table 6.1). Sample assessments are also provided that allow an instructor or workshop leader to evaluate these skills in each respective group.

Table 6.2. Step 2: Sample Evidence That the Goals in Step 1 Have Been Reached and Assessment That Allows Participants or Students to Demonstrate This Evidence

Graduate Scientific Writing Course	Publication Workshop
Evidence: Students will submit a revision of their work that incorporates feedback from self, peers, and instructor.	Evidence: Participants will include an appropriate amount of background explanation for the intended readers' knowledge level, appeal to the values

Assessment: Submit revision and accompanying reflective cover letter describing self-assessment, peer feedback or reviewer feedback, and how the draft version responds to that feedback.	of the readers, and include research applications that are relevant to the readers. Assessment: Identify and describe target readers (journal readership) in a short paragraph. Submit a draft of the introduction section that demonstrates the writing is tailored to these readers. Attach a cover sheet explaining how the draft was tailored to the intended readers.

Step 3: Decide What Content You Will Cover in Lectures, Discussions, and Activities to Help Learners Reach the Goals You Have Set

The next step is providing instruction to help students and participants learn the content. To do so, create a schedule of topics, activities, and assignments that support writers in building the desired skills and knowledge in a staged fashion. Samples of instructional content and activities are provided in Table 6.3 to demonstrate this point.

Table 6.3. Step 3: Sample Content, Activities, and Assignments to Help Learners Reach the Goals	
Graduate Scientific Writing Course	Publication Workshop
Instructional content: Train students to conduct self-assessment and peer review.	Instructional content: Teach participants how to find information about a journal's readership and describe and

Activities: Provide time and a structured process for self and peer review, including a discussion with the peer reviewer and instructor to clarify comments and talk through organization and ideas.	show examples of writing targeted to different readers. Activity: Discuss an example, such as an introduction to a scientific paper, and how it is or is not effectively tailored to the target readers.

Tailoring Your Course or Workshop to the Participants

Just like you should write to your target readers when preparing a journal article, the material and delivery for teaching scientific writing should be tailored to your trainees. Understanding student background and experience level will allow you to adjust the content to the appropriate level. The ideal is to provide information that is relevant to student goals, but it's also important to spend time on concepts with which students have indicated they are not familiar or want more experience. For example, newer researchers (including students) might not understand elements of writing for publication such as what an impact factor is or what article-level metrics are. If the goal is publication, these are important topics to cover. Research shows that adjusting the instructional material and delivery to your learners' goals will also help to leverage their motivation and enhance their performance.[84]

To learn about your students or participants, consider surveying them to capture their goals for the course, experience level, writing challenges and strengths, and available resources (such as citation managers, access to the scientific literature, etc.) before the course[249,250] or workshop.[251–253] Boxes 6.1 and 6.2 list example items to consider for a pre-course survey for graduate students and a pre-workshop survey for

professionals, respectively. The information from the course survey should be used to tailor your instructional materials and to adjust your interactions with and support of students.[249,250]

Box 6.1. Activity Idea: Example Items to Assess in a Pre-Course Survey for Graduate Students Enrolled in a Writing Class[249,250]

- Do you have a preferred name or nickname?
- What are the most important considerations that will impact your ability to participate fully in this class?
- What do you most hope to learn from this class?
- Do you have any concerns about this class?
- Do you have a preferred way of writing? What has worked for you in the past?
- What are your career goals after graduating?
- Briefly describe any previous instruction on scientific writing and publishing.
- Have you coauthored a published paper in a peer-reviewed journal? Have you first authored a publication?
- Is there anything else you would like to me to know?

For workshops aimed at professionals, you may require participants to bring an in-progress manuscript to support them in developing their paper during the workshop.[251] Some of the sample questionnaire items in Box 6.2 inquire about participants' draft manuscripts.

Box 6.2. Activity Idea: Sample Items to Assess in a Pre-Workshop Survey for Professionals

- What is your occupation?
- Briefly summarize your previous instruction on scientific writing and publishing.
- What do you consider your biggest writing and/or publishing strengths and challenges?
- What are your goals for completing the workshop (what do you hope to gain from the workshop)?
- What skills are you most interested in learning at the workshop?
- Please share the research objectives you are investigating in the manuscript that you plan to bring to the workshop.
- Describe how complete this draft manuscript is.
- What are your publishing goals for the coming year?
- How many peer-reviewed articles have you published as first author, last author, and/or coauthor in a "middle" position?
- Do you have access to a librarian at your institution?

- Does your institution have subscriptions to major journals? How easy is it for you to access articles behind a paywall (articles that are not open access)?
- Do you have a mentor to help you with writing and/or publishing?
- Do you have access to analytic software such as Stata or NVivo?

Allowing Learners to Immediately Apply Concepts With Discussion and Activities Using Their Own Writing

Activities and discussions are better for promoting thought compared to lectures.[77,93,254] While lectures can effectively transmit information, integrating activities and discussions into your instruction can meaningfully deepen learning.

Ideally, writers in classes and workshops will have the opportunity to apply concepts to their own draft papers through activities and discussion. There are three reasons that explain why this is an effective pedagogical strategy. First, students must connect new knowledge to existing knowledge to learn.[84] Second, learning is not a passive activity: it requires students to engage and participate.[84] Third, students are invested in their own writing, so allowing them to apply new skills and knowledge to their own work will enhance their motivation.[255] Each of these points is elaborated below.

Building New Knowledge on Existing Knowledge

We connect what we learn to our existing knowledge, interpreting new information based on our current knowledge, beliefs, and assumptions.[84] In fact, to learn, students must connect new knowledge to their previous knowledge.[84] If writers have their own work with them during instruction, activities, and discussions, they will be poised to connect new material to their own work and writing process.

Learning Is Active

Learning skills and knowledge through lectures is not enough to improve writing skills. To learn to effectively communicate in a specific format, tailored for a particular

readership, writers need to integrate and apply a set of complex skills and knowledge. While looking at and analyzing examples is helpful, there is no substitute for trying out a new writing strategy or revising text in response to specific feedback.[84] For example, Box 6.3 shows a sample activity asking trainees to do a figure makeover incorporating principles learned from instruction (see Chapter 19 for principles on creating effective figures). The sample activity incorporates self-assessment because it asks trainees to reflect on and evaluate their own work. This type of reflection—wherein trainees view their work from a distance—provides practice in making judgments about the quality of writing and deciding what revisions are necessary. The benefits of this activity transfer to other writing activities.[93]

Helping a Writer Develop Their Own Work Enhances Motivation

Motivation is a key factor in completing a writing project and in developing writing proficiency.[256] The benefits of publishing a paper, finishing a dissertation, or being recognized and rewarded for your work are key drivers.[257] Thus, if writers see the benefit of applying instructional content to their own work, they will be more likely to stay engaged.

Box 6.3. Activity Idea: Sample Figure Makeover Activity (Can Be Paired With Material in Chapter 19 on Creating Figures and Tables)*

- Summarize the main message you intended to convey with your figure. Looking at it with "fresh eyes" while considering your summary, does your intended message come across? If not, why not?
- Does the figure contain all the elements necessary for the reader to understand your figure without having to consult the text? If not, add details that allow readers to understand it as a standalone component.
- Do your captions include information on who (the participants), what (is being shown in the figure), where (the setting), when (dates data were collected), and how (the analytic approach used if relevant [e.g., statistical tests performed])?
- Are the figure axes labeled?
- Are statistical tests reported in the figure described?
- Is the color scheme colorblind friendly and does it have enough contrast?

*If students do not have their own figure for review, an example figure can be provided.

Sample Course Curriculum

Table 6.4 offers a sample graduate scientific writing course curriculum with topics, learning objectives, activity ideas, and key resources that can be adapted for your class. The curriculum is based on a course to help Master of Public Health students complete their research capstone paper. The topics and learning objectives were designed for a 15-week class that meets for 2 hours per week. The example curriculum, learning objectives, and activities should be adapted to your context.

Ordering the topics for a course can be challenging. I always joke with my students that everything needs to be covered in the first 2 weeks to prepare them to start writing and fit in time for feedback and revision. Following the backward design approach,[76] plan your schedule by starting with the learning goals and create the schedule working backward from the final paper deadline to ensure students have time to revise after getting feedback.

Table 6.4. Sample Graduate-Level Scientific Writing Course Curriculum. Chapter Numbers, Shown in Parenthesis, Identify Where Corresponding Material Is Covered In This Book*

Topic	Sample learning objectives and planning resources: *By the end of the class period, students should be able to…*	In-class activity ideas and planning resources
• Review syllabus and technology use guidelines for class	• Articulate course expectations and policies • Identify which technologies are appropriate for which writing activities in this course (8)	
• Structure of academic journal article (overview) • Effective research objectives	• Describe the structure and arguments made in an academic journal article (3) • Explain what makes research objectives effective (16)	• Identify and review example research objectives from mentor texts (1)

Table 6.4. Sample Graduate-Level Scientific Writing Course Curriculum. Chapter Numbers, Shown in Parenthesis, Identify Where Corresponding Material Is Covered In This Book*		
Topic	Sample learning objectives and planning resources: *By the end of the class period, students should be able to…*	In-class activity ideas and planning resources
• Choosing a target journal • Writing to your readership	• Apply approaches to identify the appropriate journal and readership for your paper, find a description of the core readership of target journal (3,14) • Apply approaches to tailor writing to readership (3)	• Identify target journals with Journal Author Name Estimator (JANE; 14) • Analyze mentor text to evaluate how well the writing is tailored to the journal's core readership (1,3)
• Reading strategies • Source use and annotation • Plagiarism	• Describe different reading strategies for different purposes (2) • Describe what plagiarism is and key strategies to avoid it (2) • Explain how to annotate articles in a way that avoids risk of plagiarism (2)	• Ask students to select an annotation strategy to use for this class (2, 4)
• The writing process • Paper planning	• Describe stages in the writing process (5) • List key process planning and content planning techniques (5)	• Choose one process planning technique and engage in it to plan the first assignment (4, 5)
• Introduction section: components, creating persuasive arguments, citing appropriately	• Explain the purpose of and major arguments that should appear in the introduction section (3, 15) • Tailor the introduction to your intended readers (3, 13, 15)	• Create a says/does analysis of the introduction section of a mentor text (1, 3, 15) • Select key introduction section pitfalls from Chapter 15; review own or a partner's draft to identify whether such pitfalls are present and suggest solutions (5, 15)
• Methods section: components	• Identify methods guidelines and checklists that are relevant to study design and paper (17)	• Create a says/does analysis of the methods section of a mentor text (1, 3, 17) • Select key methods section pitfalls from Chapter 17; review own or a partner's draft to identify whether

Table 6.4. Sample Graduate-Level Scientific Writing Course Curriculum. Chapter Numbers, Shown in Parenthesis, Identify Where Corresponding Material Is Covered In This Book*		
Topic	Sample learning objectives and planning resources: *By the end of the class period, students should be able to…*	In-class activity ideas and planning resources
		such pitfalls are present and suggest solutions (5, 17)
• Results section: components, creating persuasive arguments	• Describe different ways to organize a results section (18) • Explain how to avoid inappropriate causal language in paper (18) • Create figures and tables with a clear message that include necessary details to help readers understand context of the results (3, 13, 19)	• Do a figure makeover (6) • Select key visuals pitfalls from Chapter 19; review own or a partner's draft to identify whether such pitfalls are present and suggest solutions
• Discussion section: components, creating persuasive arguments, citing appropriately	• Describe purpose of discussion section and list major components that should be considered for inclusion in discussion section (20) • Tailor discussion to intended readers (3, 20)	• Create a says/does analysis of the discussion section of a mentor text (1, 3, 20) • Select key discussion section pitfalls from Chapter 20; review own drafts or a partner's draft to identify whether such pitfalls are present and suggest solutions
• Student consults	• Meet with students for brief consults to allow them to ask questions, seek advice, and/or share bottlenecks (1, 4)	
• Authorship • Using technology for writing activities	• Describe standard criteria for manuscript authorship and identify where they can be found (14) • Describe how position of an author in author list is tied to specific roles and that roles vary according to discipline (14) • Explain common author team communication problems and how to avoid them (14)	• Identify author guidelines for target journal via a web search • Share any previous difficult author group situations or questions and discuss
• Writing an effective abstract and title	• Describe structure and content of an abstract (21)	• Create a says/does analysis of the abstract of a mentor text (1, 21)

Table 6.4. Sample Graduate-Level Scientific Writing Course Curriculum. Chapter Numbers, Shown in Parenthesis, Identify Where Corresponding Material Is Covered In This Book*		
Topic	Sample learning objectives and planning resources: *By the end of the class period, students should be able to…*	In-class activity ideas and planning resources
	• Articulate function of a title (22)	• Select key title and/or abstract pitfalls from Chapters 21 and 22; review own or a partner's draft to identify whether pitfalls are present and suggest solutions
• In-class self-assessment of draft paper	• Describe benefits of and approaches for reviewing, analyzing, and revising own text (5) • Apply self-assessment approaches to assess and analyze text (5)	• Complete a says/does analysis of own introduction section and discussion section (1, 5)
• In-class peer review of draft paper	• Describe benefits of peer review and best practices for peer review (5) • Engage in peer review (1, 5)	• Complete an in-class peer review with a classmate (5), or use ChatGPT to identify suggested revisions (8)

*For supplementary planning resources, refer to the related open-access resources at the end of the chapter

Teaching a Publication Workshop to Early-Stage Researchers: Sample Agenda With Topics, Learning Objectives, Example Activities, and Resources

Table 6.5 presents a sample publication workshop agenda that can be adapted for workshops of different lengths. It includes topics, learning objectives, and resources. Activities can be found in the chapters listed in the table. If you are teaching a 1-day workshop, you will need to identify which topics are most appropriate based on the needs and experience level of your participants. If you are teaching a less experienced group and have a bit more time, you may want to prioritize the topics of authorship, literature searching, citation managers, and responding to peer reviewers, along with the "core"

sections of a paper. More advanced groups may prefer content on promoting themselves using social media, including hands-on instruction on creating visual abstracts and a discussion of article-level metrics and preprints (topics covered in Chapter 14).

There are a variety of ways to order your workshop sessions. Some may choose to organize the topics chronologically by writing activity (with selecting a target journal first and writing a response to reviewers last, for example); however, there is no one "right way" to organize the material. With that in mind, where possible, you still may decide to avoid back-to-back sessions focused on the main sections of a manuscript, as these tend to be longer and more intense. As an example, after a session on writing the introduction section, you might decide not to move immediately to the methods section. Instead, you might insert a shorter, punchier segment. Titles tend to be a favorite topic, and participants enjoy coming up with "title makeovers" in small groups. That said, timing can be tight for a 1-day workshop, and fitting in smaller topics might not be possible if you are trying to cover the four major sections of a paper. However you design your workshop, be sure to incorporate activities into every session.[84,255]

Finally, as alluded to above (see Box 6.2), surveying your participants before the workshop to learn about their writing goals, experience level, writing challenges and strengths, and resources available to them (such as citation managers, access to the scientific literature, etc.) will help you plan a more effective workshop.[251,252]

Again, requiring participants to bring a draft manuscript to the workshop can further help create an engaged, deeper learning experience for participants.[84,253,255] At the same time, this requirement makes timing challenging.

The sample agenda presented in Table 6.5 pairs topics with sample learning objectives and planning resources. The learning objectives lend themselves to hands-on activities. For example, after presenting material on selecting a target journal, participants can select a target journal using the suggested strategies in Chapter 14. After presenting how to write a given section of a paper, they can peer review each other's drafts using the peer review tips in Chapter 5.

Table 6.5. Sample Agenda for a 3-Day Publication Workshop for Professionals

Day	Topic / Session	Sample learning objectives (chapter number where corresponding material is covered in this book*)
1	Select a suitable target journal	• Describe strategies to select target journal (14) • Articulate factors to consider when deciding on target journal (12) • Use resources and strategies to avoid predatory journals (14)
	Authorship criteria and author communication	• Describe standard criteria for manuscript authorship and where this information can be found (10, 14) • Explain how author order is tied to specific roles and that roles vary according to discipline, institution, and research group (10, 14) • Describe common author team communication problems and apply strategies to avoid them (10, 14)
	Plagiarism, genAI technology, writing, and publishing	• Define plagiarism (2) • Describe ethical and professional standards for generative AI use (6) • Authorship and genAI (6)
	"Backward" writing (in which you start by identifying your goals)	• Identify why it is important to choose a target journal and identify core readership early in writing process (3, 14) • Avoid predatory journals (14) • Describe what preprints are and the value of publishing a preprint (14)
	Set up your paper with a solid introduction	• Describe purpose of introduction section (3, 15) • List the five major elements of an introduction section (3, 15) • Apply strategies to tailor introduction to your intended readers (3, 13, 15)
2	Summarize your paper with a	• Describe format of structured and unstructured abstracts (21)

Table 6.5. Sample Agenda for a 3-Day Publication Workshop for Professionals		
Day	**Topic / Session**	**Sample learning objectives (chapter number where corresponding material is covered in this book*)**
	clear and succinct abstract	• Identify common pitfalls of writing abstracts and apply strategies to avoid them (21)
	Promote your paper with a compelling title	• Write an effective title (22) • Describe strategies to evaluate and revise title (5, 22)
	Describe and justify your approaches in your methods section	• Describe purpose of methods section (17) • List information that should be included in methods section (17) • Identify relevant guidelines for writing the methods section such as those in Equator Network (https://www.equator-network.org/)
	Craft effective tables and figures	• Describe how to create table or figures with clear message that is tailored to readership (3, 13, 19) • Explain how to create figures and tables that include necessary details to help readers understand the context of results (19) • Apply basic design principles for tables and figures (19)
	Write a compelling cover letter	• Describe the value of a cover letter (11) • Describe structure and content of a typical cover letter (11) • Write a compelling cover letter for manuscript submission (11)
3	Highlight your results with text	• Describe different ways to organize results section (18) • Use appropriate language to describe results that aligns with study design (18)
	Respond to journal peer reviewers	• Describe peer-review process (23) • Explain the value of reviewer comments, even if the paper is rejected (23) • Apply tips and strategies for responding to reviewers in a way that will support moving forward in the publication process (23)
	Improve your writing productivity	• Describe myths that act as barriers to writing productivity (12) • Apply tips for increasing writing productivity (12)
	Interpret and contextualize with your discussion section	• Describe purpose of discussion section (20) • List major components that should be included in discussion section (20) • Describe how to tailor discussion to intended readers (3, 13, 20)

*For supplementary planning resources, refer to the open-access resources at the end of the chapter

For graduate students working toward a publication, you will likely want to cover similar material, but some topics may not be as relevant (building an author team, for example). There may also be additional topics that need to be covered such as describing impact factors; their utility, strengths, and limitations; and strategies for searching the literature. Of course, the topics should be tailored to what you learn about the group's background and goals.

Related Open-Access Resources

- The International Committee of Medical Journal Editors criteria for authorship and Disclosure of Financial and Non-Financial Relationships and Activities, and Conflicts of Interest is a current standard in publishing.
- The Committee on Publication Ethics ("COPE") Authorship and Contributorship Guidelines is an additional trustworthy source on authorship standards.
- Luby S. Southern DL, The pathway to publishing: A guide to quantitative writing in the health sciences. https://doi.org/10.1007/978-3-030-98175-4.
- Busse, C., August, E. How to Write and Publish a Research Paper for a Peer-Reviewed Journal. *J Canc Educ* **36**, 909–913 (2021). https://doi.org/10.1007/s13187-020-01751-z
- Mensh B, Kording K Ten simple rules for structuring papers. PLoS Comput Biol 2017;13(9): e1005619. https://doi.org/10.1371/journal.pcbi.1005619
- Free, online platforms such as AuthorAID provide a range of scientific writing and publishing resources.

- Zelner J, Broen K, August E. Backward paper writing for the data sciences. Patterns; 2022; 3(3). https://doi.org/10.1016/j.patter.2021.100423
- Equator Network is a website containing a collection of writing guidelines and checklists for different types of papers.

Instruction Planning Ideas

- Pick a course you teach regularly and using the concept of "backward design," review how your goals for the course match the content you cover. Does your content (or your goals) need to be revised so they are in better alignment?
- Review questionnaire items in Box 6.1 for surveying students prior to teaching a class. Do you feel that you know your students well enough to confidently answer the questions? If not, consider implementing a survey next time you teach the class.

Chapter 7: Creating Effective Writing Assignments for Health Science Courses

Chapter 6 emphasized that to effectively plan a writing course or workshop, you should start by identifying your desired results and work backward to design content and assignments to achieve those results. This chapter focuses more narrowly on creating writing assignments that convey clear goals and instructions for helping students to reach them, and on equitable means for assessment.

Many of you have undoubtedly read student papers that report a summary of information drawn from various sources without a deliberate structure or underlying arguments. Such papers may include a great amount of detail without making any overarching claim or proposing any ideas. It can seem as if a student chose a set of articles and simply strung together summaries of information from them.

Writers of these types of papers are most likely not being intentionally lazy or sloppy. They may be trying to write something they think will satisfy you, while being unaware of expectations to create an overarching argument and structure.[87] Other common pitfalls include over or under explaining information, writing that does not use standard scientific communication conventions such as those relating to tone and style, as well as other disconnects between student writing and what is published in scientific discourse.[3] Providing explicit guidance on your expectations will help students understand what makes a good paper and the process required to write one.[34]

This chapter presents recommendations for creating effective writing assignments for research papers in the health sciences.[39,40,230] These recommendations will help you guide students to produce clear, compelling documents that present coherent and well-supported arguments tailored to their intended core readership. The modifiable sample

assignment excerpts are intended to provide ideas about how to support students in deeply engaging in the content they are writing about and practice disciplinary ways of thinking.[6]

The recommendations aim to position instructors in supporting all students in improving their writing skills and to disrupt status quo teaching that advantages those who enter the classroom with more privilege, such as students who received more comprehensive undergraduate training in writing than their disadvantaged counterparts.[258,259]

Present a Real-World Disciplinary Problem to Be Addressed Through Critical Thinking

Addressing a complex, real-world problem in an assignment enhances a student's critical thinking because it requires deep reading, an appraisal of the literature, and creating arguments to address the problem.[103,260] Students must understand and evaluate what has already been done to address a particular problem and develop their own arguments about the next step to bring the area of research forward.

Writing about real-world context and problems also helps students deepen their disciplinary understanding and develop their professional identities.[3,6,41] For example, if an instructor for a research class in a health behavior program may assign a scoping review paper on racial/ethnic disparities in e-cigarette use in the United States. In addition to familiarizing themselves with different factors that impact tobacco use and addiction, students will use their critical thinking skills to reflect on and develop their disciplinary identity and values.[41] Further, students report preferring to write assignments with a strong disciplinary focus and recognize the many benefits of writing

about real-world problems—they find these types of assignments more engaging.[229] Additionally, those asked to engage in such assignments tend to be motivated to produce a high-quality product.[84,93] To meet this recommendation, you may decide students should write about their own research (for example, their thesis research), while allowing them to integrate external research projects as appropriate. Allowing students to write about their own research may further enhance their motivation for the work.[255] Further, students who identify their own topic and setting for their paper (for example, choosing to write a paper on a health topic related to their home setting) have the opportunity to leverage their expertise, creating more inclusivity and shifting power away from the instructor as the sole expert.[91,118,171]

Support Each Step in the Writing Process With Specific Tasks

Assignments and activities like planning, drafting, feedback, and revision should be sequenced to support students' active engagement throughout the writing process.[260] For example, after conferring with a student and approving their research topic and question, you may require activities to support them in planning and organizing content such as creating annotations for their readings and brainstorming. Later, you may organize self-review, peer review, and instructor feedback on drafts—allowing students to revise and resubmit—to help them learn from different types of feedback and improve their products.

Opportunities for students to stage their writing and to receive and respond to peer and instructor feedback, create space to craft a high-quality product. This approach is also considered an equitable one, as students have a chance to respond to feedback and make adjustments instead of one shot at creating a fully-developed product.[261] Additionally,

peer review is an equitable practice offsetting the instructor's power and provides students an opportunity to guide each other through their own agency.[86]

To further support student agency and individuality, they should be given multiple options in the way they complete their assignments; for example, some students may prefer to plan their content using an outline while others may be more successful using other brainstorming techniques.[189] More about this universal design approach is discussed in Chapter 4.

Describe the Learning Objectives and Purpose of the Writing

Assignment instructions should clearly explain the learning objectives and also identify the purpose of the writing (see Box 7.1 for a sample learning objective and purpose of the writing).[34,262] For research papers, the purpose may be to investigate a research question and create new knowledge. A clear purpose gives students a goal to work toward and provides them (and you) a standard for gauging whether the writing was successful.[39,230] Such transparency is an equitable teaching practice because it clearly communicates the performance standards to all students.[34,260]

Box 7.1. Assignment Idea: Sample Learning Objective and Purpose of the Writing

INSTRUCTIONS

- Write a complete draft of your introduction section. Use the assignment rubric as an additional guide.

ASSIGNMENT DETAILS

- Learning objective for assignment: Apply what you have learned about the structure, tone, and style of academic writing to your introduction section draft, and to develop effective arguments about why your research is important,

where the research gap is, and how your study addresses the gap. Thinking through these arguments on paper helps you improve your critical thinking skills and provides practice for developing all kinds of arguments.

- Purpose of the writing: Your research paper, through sharing your original research results, will create new knowledge in public health.

Help Writers Create Meaning With Deep Reading Practices

Reading is the first stage of writing, and students create meaning through forming judgments about the literature and synthesizing new information into their own paper.[103,260] Directing students to search the literature, decide which papers are worth reading, and critically evaluating the research presented in their source material helps them understand what has already been done in a particular research area, how other researchers have evaluated similar questions, and what future research studies are needed.

You should also familiarize your students with specific strategies for reading and build these into your required activities. For example, you may start by offering students strategies for evaluating potential sources such as becoming more mindful about their purpose for reading and the need to adjust their strategy to this purpose, previewing / skimming, and reading selectively.[103] Then, review close reading strategies to help them synthesize information and ask them to turn in a spreadsheet with article annotations for a subset of articles.[103]

Require Students to Write in the Format of an Academic Journal Article and Identify the Intended Readers

Regardless of whether students plan to publish their papers, ask them to write in a professional format.[39,263] For example, require students to write a journal article that

follows the author guidelines for a specific academic journal rather than a generic "10-page research paper." Writing an article for a discipline-specific journal will allow students to better understand how knowledge is created and disseminated in their field.[230,263] This type of writing also helps students develop a deeper understanding of the activities, values, professional roles, and context of their discipline.[41,42,112,224–228]

Along with asking students to write in a real-world professional format, you (or they) should identify a target readership to whom students should write. These two guidelines go hand-in-hand to make the experience of writing more dynamic and interesting, and to help them practice the crucial writing skill of effectively reaching their intended readers.[87,230,263]

In the case of a research paper, the intended readers will be the core readership of the student's target journal. While the intended readers may not actually read the student's work (if the student does not publish their paper), identifying a target readership is essential to help students practice tailoring their writing and core arguments to a specific type of reader.[87] For example, students will need to provide an appropriate amount of background information to explain their topic to their intended readers, identify which information is important to include, and decide which jargon they may use or ought to avoid.[264] They will also need to consider their readership in establishing the values to which they will appeal when arguing that their topic is important and when discussing relevant applications of their research.[3,39,93,135,230]

Along with the requirement to choose a journal and write to its readers, providing mentor texts (i.e., model articles, ideally from a student's target journal) will help them "read them like writers."[81] That is, students should study the writing strategies covered in

class that they identify in mentor texts to reach their intended readers. Prior to drafting their own writing, consider asking students to complete a says/does analysis[115] (described in Chapter 2) in which they identify standard arguments (such as why the research is important) in their mentor text and how these arguments are or are not appropriately tailored to the intended readers. The exercise in Box 7.2 will better position them to craft effective arguments themselves.[115]

Box 7.2. Assignment Idea: Sample Language Describing Reading/Annotating Activities as Well as the Intended Readership

Activities you should have completed prior to starting assignment:

- You should have chosen a target journal and identified the journal's readership (they will be your intended readers), read and annotated key articles, and reviewed your example mentor texts.
- Intended readers: The readers of your target journal (you are not required to publish your findings, but you should write your paper as if you will publish it).
- Length: Approximately 3-6 paragraphs (it should be similar to the length of your published example articles).

Identify Authorship Requirements, Conventions, and Practices

Students may be the sole authors of their assignments, or they may be working collaboratively with classmates or outside coauthors; some will plan to publish their assignments, and some will not. Regardless, introducing them to requirements, conventions, and practices related to authorship is important to help them critically evaluate communication products and develop strategic skills for professional success.[6]

When students create a written product in a real-world document type such as an academic journal article, meaningful questions arise that may not occur to students writing in a generic, contextless format. For example, a student may wonder about the significance of the order of authors in the author list or the types of activities that qualify someone as an author. Explicitly training students about authorship criteria, collaborative writing practices, author order and responsibilities, as well as good communication can prepare them to consider how collaborative writing may be organized and negotiated in various professional settings.[265] Writing in such a format also helps to socialize trainees into a discipline and help them learn academic literacies.[6,48]

If students are collaboratively authoring their assigned work (such as if they will eventually publish the papers they are working on in your class), be clear about whether students should only submit their own work in the class (as opposed to work that reflects their collaborator's input) and encourage them to ask for their coauthors' input and feedback at the appropriate times. For example, guidance on authorship might specify "You should be the sole author on this assignment, even if the published version of the paper will include coauthors."

Require Visual Elements

Visuals such as figures, visual abstracts, diagrams, maps, and photographs are the centerpiece of scientific communication, including journal articles.[266,267] Requiring students to incorporate at least one such element into their papers will help them learn to create compelling standalone visuals with clear messages.[268] Because the presentation of visual elements is discipline specific, this requirement will also help students learn disciplinary ways of thinking and writing.[269]

Refer to Chapter 19 for advice on developing effective visuals, including critical topics such as tailoring a visual to the readers, creating an argument with your visual, using color and contrast effectively, and making your visuals accessible to those with sight impairments.

Including visual elements in the rubric you use to assess assignments will help students understand that these elements are a priority.[268] However, not every section of the paper will need to include visuals. For this example, the introduction may not have a visual element, but the results should. Box 7.3 provides an excerpt from a sample assignment that asks students to submit a draft of their results section including visual elements.

Box 7.3. Assignment Idea: Sample Language Requiring Visual Element Such as a Table and Figure

INSTRUCTIONS

- Write a complete draft of your results section including text, at least one figure, and one table. Use the assignment rubric as an additional guide.

ASSIGNMENT DETAILS

- Learning goals for assignment: Apply what you have learned about the structure, tone, and style of academic writing to your results section draft and to develop effective and compelling visuals that help you communicate your results.
- Purpose of the writing: Your research paper, through sharing your original research results, will create new knowledge in public health.

Require a Thoughtful Title for the Document

The title is a crucial part of a journal article (as is the case for most other types of documents).[270–272] After reviewing the title, readers decide whether to continue reading the rest of the document and an effective title may also boost citation frequency and impact.[270,271] The tendency for many students is to title their papers generically as "Scoping Review" or something similar, reflecting their lack of experience and understanding about the crucial importance of writing a good title. Students should be aware of the importance of titles and should have the chance to practice writing effective titles.[273]

Chapter 22 guides writers on crafting effective titles for their journal articles and covers topics such as making the title informative and interesting, including obvious keywords to help potential readers identify a paper in a search, and common title formats.

Explicitly requiring a title and providing criteria for an effective title in the rubric will provide practice to help students develop this professional skill, as well as supporting students in developing their critical thinking skills. Consider suggesting to students that they write their title (or finalize it) after they have a complete draft of the paper, when they have a clear sense of the paper's message.[274] Asking students to pair with a partner for feedback on their draft titles can help support this activity, leaning into the social aspect of writing and writing instruction.[52] Table 7.1 shows a sample rubric item for a title.

Table 7.1. Sample Rubric Criterion for a Title			
Criterion	**Exemplary (4-5 points)**	**Satisfactory (2-3 points)**	**Unacceptable (0-1 point)**
Your title invites readers to continue reading the full article and helps your paper get discovered by someone searching the literature.	Your title is informative and interesting, describes the main story of your paper, argues that your paper is worth reading, and includes obvious keywords that will bring your article up in a search. Your title does not include jargon or abbreviations.	I have a limited understanding of what the paper is about based on your title, and/or the title does not include obvious keywords that will bring your article up in a search, and/or your title includes jargon or abbreviations.	The title is not clear, does not include keywords that describe the content of your paper, and/or includes jargon or abbreviations.

Provide Guidelines for Technology Use

Technology guidelines set standards for academic integrity and support learning goals for the class. Chapter 8 goes into detail about providing guidance to students on technology use, but I include this recommendation here for the sake of completeness. To develop technology guidelines, start by considering the tasks students must engage in to complete the writing assignment. For each task (e.g., searching for source material, reading primary sources, annotating source material, brainstorming, generating text, etc.), explain which technology is acceptable and which is not and provide a justification for

the guidance. The sample assignment excerpt in Box 7.4 shows guidance on using technology for generating introduction text.

Box 7.4. Assignment Idea: Sample Language Guiding Students About Technology Use

You may not use generative AI (such as ChatGPT) to generate introduction text because:

a. it would prevent you from gaining experience thinking through and creating arguments, such as the standard introduction elements like why your research is important.
b. the text generated from AI may not be accurate.
c. using AI to generate text is not equitable because those using AI-generated text may have an unfair advantage over those who generate their own text.
d. AI-generated text is not considered as authorship by the US Copyright Office, academic journals, and other entities.

Explain the Assignment's Requirements as Transparently as Possible and Offer Clear Criteria for Evaluation

One of the biggest challenges of teaching writing is providing opportunities for students with different backgrounds to succeed in your class. For example, first-generation students may not understand how to engage with material without a transparent teaching approach.[154,259,275] Transparency involves providing explicit and accessible instruction; for an assignment, this means conveying the purpose, required tasks, and criteria for success.[276] Transparent pedagogy has been associated with increased academic performance, and in the United States, non-white, first-generation,

and non-traditional college students have been shown to particularly benefit from this approach.[46,277]

Rubrics to Enhance Transparency, Instructional Guidance and Writing Quality

Rubrics are commonly used by instructors to provide a clear target for learning and make assessment fairer and more accurate. However, rubrics can also guide instructional design and delivery. They should be developed after you craft your learning objectives for the course and they should serve your learning objectives.[34,278] For students, rubrics can be a tool to assess their own work and a guide for peer feedback. Finally, rubrics can make learning more equitable as they make expectations explicit and transparent.[279–281] In this section, I will review the basic components of rubrics, describe two common types of rubrics, briefly review how rubrics may offer instructional guidance, and then describe the process and benefits of co-creating rubrics with students.

A rubric should explain each criterion that will be judged and the expectations for receiving full points for each criterion.[282,283] Three components commonly included are evaluation criteria, quality definitions, and a scoring scheme.[279] While evaluation criteria provide a guide to assessing the quality of a student's writing, quality definitions characterize what a student must demonstrate to show they met a given criterion (for example what counts as an exemplary, satisfactory, or poor argument that the research addresses regarding an important problem). The quality definitions should allow you to distinguish between good and poor writing and enable you to provide appropriate scores. A scoring scheme connects quality definitions to points.[279]

Rubrics can be created in a range of styles; two types that may be suitable for assigned writing in the style of a journal article are analytic and holistic.[284] In analytic

rubrics, writing qualities are divided into categories such as organization, flow, mechanics, etc. with descriptions of high, medium, and low-quality writing for each category. The number of points awarded for each category should correspond with its importance in the context of your assignment and course. A holistic rubric, on the other hand, provides criteria for the overall quality of a product rather than component parts.[284] For example, it may provide 5-6 categories describing overall quality. Links to examples of each type of rubric are provided at the end of this chapter.

Aside from their role in assisting instructors with their grading, students use rubrics to plan their assignments and as a benchmark for their developing written product.[279,280,285] Rubrics provide opportunities for students to metacognitively reflect on their work; that is, to think about their writing and how to improve it. This can be accomplished informally or students may be asked to evaluate their paper against the rubric and/or conduct peer review using the rubric as the evaluation guide. In this way, rubrics may play a role in formative assessment in addition to their role in evaluation.[279,280,285,286] Finally, students appreciate well-constructed rubrics. Research shows that they perceive rubrics as helping them produce higher quality work, earning better trades, and feeling less anxious about an assignment.[279] A sample analytic rubric showing components discussed in this section is shown in Table 7.2.

Table 7.2. Sample Analytic Rubric for a Writing Assignment*
You will be given a grade for this draft based upon the criteria in this rubric; however, your grade will be replaced with your grade for the revised (final) introduction.

	Exemplary (4-5 points)	**Satisfactory (2-3 points)**	**Poor (0-1 point)**
Paper is tailored to intended readership based on your chosen target journal	The paper is tailored to the intended readership (with	The paper is not completely tailored to the intended readership; the	The paper over-explains information that the intended readership will

Table 7.2. Sample Analytic Rubric for a Writing Assignment* You will be given a grade for this draft based upon the criteria in this rubric; however, your grade will be replaced with your grade for the revised (final) introduction.			
	Exemplary (4-5 points)	**Satisfactory (2-3 points)**	**Poor (0-1 point)**
	the appropriate amount of background, language and jargon, and framing).	background, language, jargon, and/or framing are not matched well to the intended readers throughout.	already know, or it uses jargon and/or language that the intended readers will not necessarily know without explaining it.
The health problem being addressed and its importance are clearly articulated	I have a clear understanding of the health problem the study is addressing and its importance.	I have a limited understanding of the health problem the study is addressing and its importance.	I have insufficient or incorrect understanding of the health problem the study is addressing.
What is known and the research gap is clear	I have a clear understanding of what is already known about the problem and the research gap.	I have a limited understanding of what is already known about the problem and/or the research gap.	There is insufficient or incorrect description of what is known and the research gap.
Aims/objectives are clear, testable, and aligned with the research gap articulated in the introduction section	I have a clear understanding of the research aims; they are testable and address the research gap described in the introduction section.	I have a limited understanding of the research aims and/or the aims are not consistent with the research gap presented in the paper's introduction.	The research aims are unclear and/or are not testable.
Introduction is well organized with a clear, logical flow	The paper is extremely well organized, coherent, with a clear and logical flow.	The paper is well-organized but has several issues with flow, organization, or coherence.	The paper is insufficient due to organizational, coherence, or flow problems.

Table 7.2. Sample Analytic Rubric for a Writing Assignment* You will be given a grade for this draft based upon the criteria in this rubric; however, your grade will be replaced with your grade for the revised (final) introduction.			
	Exemplary (4-5 points)	**Satisfactory (2-3 points)**	**Poor (0-1 point)**
Mechanics (spelling, grammar, typographical errors) and formatting *(I will not focus on these criteria when giving feedback on your draft, but your final paper should be formatted correctly and free of errors.)*	The paper is formatted according to the target journal guidelines and has no or very few typographical, spelling, and grammar errors.	The paper does not totally adhere to the target journal formatting guidelines and/or has several typographical, spelling, and grammar errors.	The paper does not adhere to the target journal formatting guidelines and has many typographical, spelling, and grammar errors.

Co-Construction of Rubrics

Co-construction of rubrics is a process by which students collaborate with their instructor on developing a rubric for an assignment.[279] Research has identified that participating in the development of a rubric supports student learning and critical thinking[287] and has been associated with higher quality student writing.[286] Students have reported several benefits to co-creating rubrics with their instructors, including improved learning and understanding of assessment tasks and rubric use, improved writing quality, better grades, less anxiety, improved ownership of their writing, and a recognition of the complexity and time needed for instructors to conduct assessment.[285,287] The co-construction approach to rubric development is considered an equitable teaching practice that engages students, invites them to meaningfully participate in their own learning, and shifts power toward the students.[86]

The process of co-creating rubrics also has the power to improve instructor awareness about their rubric and its effectiveness. In one study, instructors reported that

their appreciation of how students understood rubrics was enhanced after co-creating rubrics with them.[287] One instructor shared:

> What has changed is that initially I perceived that if I create a rubric that I understood then my students would arrive at the same conclusions when they read the rubric as what I did. I discovered that there was actually a little bit of a mismatch there, the things that I thought were fairly obvious were not necessarily obvious to them.[287]

In practice, students can participate in rubric co-creation in a variety of ways, from co-developing a rubric from scratch to providing input on a draft rubric. One sample procedure for co-creating a rubric is shown in Box 7.5.

Box 7.5. Activity Idea: Sample Procedure for Co-Creating a Rubric[286]

1. Together as a class, review models of the type of writing required in the assignment and discuss examples of good and poor work. Record comments made during the discussion about what makes some writing good and other examples poor.
2. Drawing on the items generated in Step 1, ask students to create a list of criteria describing how the writing should be assessed.
3. The instructor organizes criteria (for example, combine overlapping criteria) and revises for clarity if necessary.
4. Together, discuss levels of quality definitions. Record comments made during the discussion and create a draft rubric on which students may provide feedback.
5. Finalize draft with student feedback incorporated.

Challenges associated with this process include the time and logistics required to carry out the process of co-creation, including scheduling a time that allows students enough training to give meaningful input to the rubric but with enough time to complete it before the assignment is due. A more abbreviated co-creation activity can involve

discussion of an already assembled draft rubric and examples and asking students for their feedback and suggestions.

Additional Approach to Improving Transparency

If you are staging your writing assignments to mirror the writing process, you will have separate assignments or activities for pre-writing, draft(s), and revision. There are a few ways to convey explicit expectations about the final paper while making it clear that messy first drafts are an accepted part of the writing process. First, you can give an initial grade that holds students to the final expectations, with the understanding you will replace that grade with their grade for the final version.[288] Alternately, you may distribute the final rubric to set expectations, but simply mark their draft "does not meet expectations," "meets expectations," or "exceeds expectations," along with feedback to help them revise.[289,290]

On their revised paper, consider asking your students to submit a short (200-300 word), informal reflective coversheet summarizing the biggest changes they made in the revision. This act encourages writers to reflect on how they improved weaknesses in their writing, which can help them identify and overcome these problems in their future writing.[88,97,98] You can also ask them to include a range of other things like what they consider the biggest strength and weakness or challenge, depending on the assignment and course. These prompts similarly help writers identify and leverage their strengths and recognize and double-down on their weaker areas in future writing.

Box 7.6, provides an example of an explanation of how a draft grade will be counted after the final revised product is submitted, as well as an example of a policy describing how late work will be graded.

Box 7.6. Teaching Tip: Sample Language Describing Grading Policy for Writing Assignment

- Grade for drafts versus final product: The grade you receive on your draft introduction (and all the drafts you turn in) is temporary and will not count toward your final grade. The temporary grade indicates your progress in reaching the targets identified in the final paper rubric. The grade you receive on your final (revised) paper will replace your temporary grade, is permanent, and will count toward your final class grade.
- Late policy: Late work will be accepted but marked down 10% for each 24-hour period that it is late. Please request an extension in advance if you need to by following the instructions at the "request assignment extension link" on the course website. Reasonable requests will be granted; however, keep in mind that all assignments build toward a final product and getting too far behind will impact your progress.

A tool that has been shown to be helpful in creating transparency and equity for writing assignments in health sciences students is a free technology called Lettersmith (Ann Arbor, MI).[259,262,291] Box 7.7 provides a description of Lettersmith and how it supports transparency in assigned writing.

Box 7.7. Activity Idea: Lettersmith Software for Greater Transparency in Assigned Writing

Lettersmith is designed to help students understand the purpose of an assignment, required tasks for completing the assignment, and criteria for evaluation. Students can use the software to review examples of written products that are the same

style as the writing required in their assignment, and they can also tag parts of their text to identify where they met an assignment goal. Peer and instructor feedback can also be incorporated into a student's experience with Lettersmith. More information about this free software can be found on the Lettersmith website: https://lettersmith.ai.umich.edu/

Equity in Grading Across Diverse Students

One of the biggest challenges in grading is being equitable, given the diversity in writing skills in a typical classroom or research lab.[86,161,292–294] This diversity can be particularly prominent in health sciences graduate programs given that students are admitted primarily based on their quantitative skills and because of the high proportion of second language writers in some programs. Adding to this challenge is the fact that health sciences instructors are not trained to teach writing[14] and may struggle with writing or be second language writers themselves.[35]

Holding different expectations for students in the same class can feel unfair, and some instructors describe their notions of equity as maintaining the same expectation across all students.[24] While using the same (equal) standard to grade all students may feel more equitable, this is not an equitable practice because it is already considerably harder for second language writers to write in English. To actually assess student writing equitably, faculty would need to ask native English speakers to write in a different language.[161]

One approach that can enhance equity is grading students on their improvement and responsiveness to peer and/or instructor comments rather than overall quality.[161] This approach requires staging the writing with drafts and feedback and comparing a student's

draft and final paper evaluation (e.g., a completed rubric). This approach is arguably fairer to students with a wide range in writing experience and skills.[161]

Suresh Canagarajah provides another important perspective on equity, recommending that instead of viewing differences as limitations, we should respect and value them as strengths and focus on what writers can do.[170] An approach that follows this principle is to allow second language writers to write some assignments *in their own language.*[295,296] For example, students may write low-stakes reflective writing or "freewrites" in class; the goal of which is to promote thinking in their language of choice. Another option is to allow students to write their final product in their first language; for example, a journal article targeted to a journal in a student's home country (with another English version turned into you). This approach allows instructors to *lean in* to the language and cultural expertise of their students, recognizing and celebrating this diversity.[171]

To wrap up, Box 7.8 presents an overview of recommended assignment components that can be modified to fit your circumstances, setting. Instructions are placed first so that students do not miss any key information.[39,246] Additional components include a list of activities students should have completed to help them prepare for or build toward the assignment, details of the assignment, guidelines for technology use, and a rubric.

Box 7.8. Assignment Idea: Sample Components That Can Be Included in Health Sciences Writing Assignments[39,246]

- Instructions (general)
- Activities students should have completed prior to starting assignment

- Assignment details (learning goals for assignment, purpose of the writing, intended readers, length requirements, authorship requirements as relevant, explanation of how grading works for drafts versus final product, late policy, resources for completing assignment)
- Guidelines for technology use
- Rubric

Related Open-Access Resources

- Use university writing center websites as well as teaching and learning center websites to find good examples of rubrics; for example, the Yale Poorvu Center for Teaching and Learning offers excellent information and example rubrics on their website.

Instruction Planning Ideas

- Pick a course you teach regularly and select an assignment you've used in the past. Using the concept of "backward design" (covered in Chapter 6), revise the assignment to include concepts from this chapter that seem useful to you.
- Consider your rubric and how the expectations articulated may or may not align with the broader goals of the course. Does your rubric or assignment need to be modified? Do you need to revisit your course goals?

Chapter 8: Considering the Role of Technology in Assigned Writing

In this chapter, I address the uncertainty some instructors and mentors feel about the use of generative artificial intelligence (genAI) technologies such as ChatGPT for student writing. I provide a framework and three-step process to help you think through the benefits and drawbacks of genAI use for writing, and whether such technologies will help or hinder (or make no difference for) early-stage writers in reaching their learning goals. The framework, "Brave New Words," was developed by me and two collaborators for use in classroom teaching but can be modified for mentoring trainees.[246]

The chapter begins with considerations for student use of genAI, including potential benefits and drawbacks of using such technology for writing. I then present the three-step process that will help you clarify your learning objectives, reflect on how technology might interface with them, and develop guidelines about student use of genAI for assigned writing. Finally, the chapter wraps up with additional considerations for crafting writing assignments in the age of genAI.

Benefits of Using Generative AI

Several benefits of using genAI for writing have been identified, and these may be more pronounced in those with less developed writing skills. In a survey I conducted with colleagues, public health students reported using ChatGPT for assigned writing to save energy and time and to improve the quality of their work.[246] These advantages have also been shown in the context of an intervention study with professionals who were not students.[297] In this study, participants were asked to complete an initial writing assignment and then half were trained on using ChatGPT for writing. Compared to the untrained group, the trained group completed the second assignment more quickly and

produced a product that was rated as higher in quality. The trained group also received higher ratings and completed the assignment more quickly compared to their own initial assignments. Additionally, the increase in quality was better among those with poorer initial writing assignment ratings.[297]

Another advantage of incorporating genAI into writing assignments for students is that it helps prepare them for using such technology in their future workplaces.[246,298] In fact, many workplaces integrate genAI into their activities,[299–301] and genAI will likely be used even more broadly going forward. There are concerns, however, about genAI use in terms of accuracy, bias, confidentiality, and equity, which are highlighted in the next section.

Drawbacks of Using Generative AI

GenAI large language models such as ChatGPT do not always provide accurate output. This is partly because of the approach such models use for drawing upon information and generating text. Rather than searching for and summarizing information found in relevant sources, these models draw from a large corpus of data and use a predictive model to generate each word given previous words and the context. The models are not a reliable source of accurate information at this time, and Open AI (the creators of ChatGPT) acknowledges this on its host website.[302]

Further, genAI platforms are known to provide biased information.[303,304] This is in part because they are trained on datasets created by humans and calibrated with human feedback-- both of which hold biases. GenAI then perpetuates and amplifies these biases by reflecting them in the output they provide.[303,304] In the context of scientific research,

such inaccuracies and biases could lead to incorrect or biased results that impair scientific advancement.[305]

Another drawback of using genAI technologies to develop research papers is that information entered into these programs is not kept confidential (this is currently stated on the OpenAI website[302]). This is problematic for any study data that may be entered for analysis. Additionally, using ChatGPT to generate text or provide feedback on draft text can be an issue because manuscripts submitted to a peer-reviewed journal must not have been published prior to submission. Leaked text could result in another person accessing and using an author's text inappropriately.

Finally, these technologies present multiple barriers to equity. First, equitable access to genAI platforms is not possible, given the recent introduction of charges to access more sophisticated versions of these technologies.[302] Such financial costs will lead to further disparities between students of high and low economic status as well as disparities between researchers in high- and low-income countries. Further, English language genAI models are currently biased toward Standard American English, meaning that the writing styles and dialects used by non-white cultures and ethnic groups are at risk of being penalized for using a non-privileged, non-white-dominated style of writing.[306]

Introduction to the Brave New Words Framework

A Three-Step Process to Clarify Your Thinking and Craft Guidelines

The three-step process presented below is meant to help you think through the details of a particular assignment and any relevant technology that could be used for completing the assignment, ultimately leading to the development of appropriate

technology guidelines. Such guidelines both set standards for academic integrity in your class and support learning.[307] The material draws heavily from an open-access article, "Brave New Words: A Framework and Process for Developing Technology-Use Guidelines for Student Writing" I co-published in 2023 with two colleagues (Drs. Olivia Anderson and Frederique Laubepin).[246]

While this framework was developed to guide instructors on developing policies regarding student genAI technology use, it asks users to consider technology broadly as anything that automates a process. In addition to genAI such as ChatGPT, this includes data analysis software, Excel, DALL-E, search engines (Google, PubMed, etc.), JANE (Journal Author Name Estimator), as well as grammar and spell checkers and reference formatting programs. This definition of technology is meant to help instructors reflect on the impact of a range of technologies on learning and to compare their impact on learning.

As in the rest of this book, writing is defined broadly in this framework as any activity that helps bring a written product to fruition, including reading, annotating and synthesizing information, planning activities such as brainstorming or outlining, writing draft text, creating visual elements (e.g., tables, figures), revising, editing, and formatting. Breaking down writing into these component activities can help you get really specific about the benefits of writing for students, and how technology might appropriately support learning or hinder it for any given writing activity.

To demonstrate the process, an example in-class activity from our open-access publication is provided.[246] The example activity (see Box 8.1) asks students to enter their introduction section draft (or alternative text, if they have confidentiality concerns) into

ChatGPT and prompt it for writing feedback.[4]

Step 1: Develop Learning Objectives for Your Assignment

Learning objectives, which describe the intended outcome of learning, are the foundation for your assignment.[76] A well-written objective articulates the specific knowledge or skills students will acquire and demonstrate, using observable and measurable verbs. Bloom's taxonomy[308] can be helpful for classifying your learning objectives. It provides a list of relevant verbs organized according to the cognitive level at which students should be performing. Of course, if you have already developed learning objectives or if you are adhering to external objectives (such as those created by an accreditation body) you may skip this step.

An excerpt from the example activity, including the instructions, activity details, and learning objectives, is shown in Box 8.1.

Box 8.1. Activity Idea: ChatGPT Peer Review[246]

INSTRUCTIONS

- You have composed your introduction text and received feedback on it from a peer. This assignment builds on these activities and leverages AI technology to get additional feedback on your text. It also gives you practice using and critically evaluating output from ChatGPT.
- Seek ChatGPT's feedback on your introduction (or an alternate introduction):
    - Enter your introduction text into ChatGPT and ask for feedback and suggestions for revision. If you do not want to enter your introduction

[4] Many academic institutions now have dedicated ChatGPT software platforms with privacy protections. Check to find out whether your institution hosts such a platform and adjust the activity accordingly.

text into ChatGPT, identify a published paper to use instead (if you are using an alternate text, please check in with me via email to make sure your proposed example article is suitable for this assignment). Use effective ChatGPT prompts as discussed in class, along with follow-up prompts as needed to fine-tune your output. Keep track of your prompts and the output for each and turn them in with your assignment.

- Reflective writing:
    - Describe whether you received any helpful feedback from ChatGPT (for those who used your own introduction text, did it offer any helpful perspectives that weren't provided by your peer reviewer?), and whether you got any unhelpful or confusing feedback. Give examples to support your claims about the helpfulness of ChatGPT.
    - Describe whether the feedback improved after additional prompts beyond your initial request. What language in your prompts do you think caused this improvement?
    - Share additional insights about this process. Will you use ChatGPT in the future for peer review of your work? Or if you were uncomfortable with the process, elaborate on that here.
- Turn in:
    - your introduction draft that was reviewed by ChatGPT or a statement confirming that you used the alternate text
    - all prompts (in order) you used to solicit ChatGPT to peer review your introduction

- ChatGPT's output (feedback on your introduction or the alternate text) for each of your prompts
- reflective writing as described above

ACTIVITY DETAILS

- Learning objectives for activity: Write effective prompts that will elicit the most informative output from ChatGPT; identify which part(s) of the ChatGPT output provide(s) helpful advice about your draft introduction, and which advice should be ignored because it is not helpful or because it is not correct.
- Purpose of writing: This reflective writing helps you think through the potential utility and drawbacks of using ChatGPT to improve your own writing.

Step 2: Identify How Students Could Use Technology for the Assignment and the Corresponding Impact on Your Learning Objectives

In this step, consider which technology could possibly be used for the assignment and the associated benefits or drawbacks to learning. To begin, create a list of tasks that students would need to complete to do the writing assignment. As an example, for the activity in Box 8.1, students need to complete multiple tasks, such as developing prompts for generating feedback from ChatGPT, crafting reflective writing text, as well as spelling and grammar review.

For each technology, you will need to decide whether to prohibit, encourage, or require its use for each individual task. To make this decision, consider the impact of the technology on your learning objectives. While using a grammar checker will likely not impact student learning, using ChatGPT to draft the reflective writing text would significantly hinder students in reaching the objectives. Further, in some cases, students

may both benefit and lose learning opportunities. Here, you will need to decide which is the best option for your assignment and context.

An additional consideration is whether a technology used in one part of the writing process will impact other writing activities. For example, the type of search engine students use to identify source material will determine the type of information they retrieve, ultimately shaping their paper's content.

Finally, issues related to accuracy, bias, and equity should be considered, along with the lack of confidentiality associated with certain technologies. These issues will require further investigation again and again—as they will continue to evolve over time as the technologies themselves evolve.

Table 8.1 provides an example of working through Step 2 for the example activity presented in Box 8.1.

Table 8.1. Example of How to Work Through Step 2 of the Brave New Words Framework Using the Example Activity from Box 8.1				
Tasks required for writing assignment	What technologies are possible to use for this task?	Will technology, on balance, help or hinder learning (or will it have no meaningful impact on learning outcomes)?	Will using a given technology impact other parts of the writing process?*	Are there other issues that warrant restricting technology or creating additional guidelines?**
Write prompt for ChatGPT to initiate feedback and follow-up prompts to fine-tune and improve feedback	ChatGPT	Hinder; the student should use their critical thinking skills in particular to develop follow-up prompts to help ChatGPT generate more helpful feedback.	Yes; the quality of the prompts used will impact the quality of feedback provided.	Confidentiality could potentially be an issue if students plan to publish; however, the confidential version that the university provides is appropriate.
Decide which feedback to use and which to ignore	A student might use all of ChatGPT's suggestions, relying on the technology and assuming all of the advice is worth implementing.	Hinder; the student should use their critical thinking skills to decide for themselves which feedback should be implemented and which should be ignored.	The decision about which feedback to implement will impact the quality of a student's paper.	N/A
Reflective writing	ChatGPT	Hinder; the purpose of this writing is to help students reflect on their experience and learn from it.	N/A	N/A

* For example, will automated writing impact a student's motivation to read?

** For example, professional standards, data privacy, accuracy concerns, or lack of transparency about the method used to generate output.

Step 3: Develop Technology Guidelines

The final step in the framework is developing technology guidelines. Building from the work you did in Step 2, specify whether a technology is required, permitted, or not permitted for each task and why. Sample technology guidelines are provided in Box 8.2.

For permitted or required technologies, identify what learning objective(s) the technology helps students reach or whether the technology does not meaningfully impact learning. For a prohibited technology, specify how it compromises learning. If you require students to be transparent about what and how they used a technology, be specific about how students should do this. For example, should they summarize the steps they took to verify the information from their ChatGPT output? Should they include the prompts they used in their ChatGPT query?

When creating your guidelines, consider the impact of technology on equity. As an example, for some students, it's a question of access: some students are unaware of available technology and others choose to not make use of a technology they have access to, but for others it may not be permitted, they may not be able to afford it, etc.—so, it might not be equitable if you allow such use.

Part of educating students on writing and publishing scientific articles is helping them understand professional standards such as authorship criteria. In the health sciences, many journals and organizations do not allow AI technologies, such as ChatGPT, to be considered authors because standard authorship criteria require authors to be accountable for all parts of work performed, should be able to identify which coauthors are responsible for specific other parts of the work, and should have confidence in the

integrity of their coauthors' contributions. Non-human technologies cannot be held accountable for their contributions and should therefore not be included in an author list.[309–311]

Another important consideration is whether a journal allows use of citations for ChatGPT and other large language models. At the time this book was written, JAMA citation styles, for example, only recognized content created by humans and excluded content created by genAI.[312] Finally, it's important to stay current on your university, school, and departmental guidelines to ensure your policies are in line with them.

Box 8.2. Assignment Idea: Example Technology Guidelines for ChatGPT Activity

- You must use ChatGPT to generate suggested feedback on your introduction. Using ChatGPT for this purpose helps you build your skills to generate the best possible output from the platform. Enter as many prompts as needed to maximize the effectiveness of the output. Save (and turn in) your prompts and the corresponding output. The prompts should be written by you.
- You may not use generative AI (such as ChatGPT) to generate reflective writing text because the purpose of this assignment is to foster reflection on the experience of using ChatGPT to obtain and use feedback on your text. Using ChatGPT to generate reflective text instead of writing it yourself prevents you from fully reflecting on this activity. Further, generating your own text improves your overall critical thinking skills and creativity.
- Spell check and grammar check are acceptable technologies

Adapted from: August E, Anderson O, Laubepin F. Brave New Words: A Framework and Process for Developing Technology-Use Guidelines for Student

Writing. *Pedagogy in Health Promotion*. 2024;0(0). doi:10.1177/23733799241235119.[246]

Finally, consider co-creating your technology policies with your students. Student perspectives are usually helpful and may help create a sense of agency and shared responsibility among the class.[313] box 8.3 provides additional tips for teaching scientific writing in the age of genAI.

Box 8.3. Teaching Tip: Scientific Writing in the Age of Generative AI (Adapted From University of Michigan Generative Artificial Intelligence Course and Assignment (Re-)Design).

Tips for guiding and managing technology use in scientific writing.

- **Ask for transparency.** Transparency is an important aspect of scientific investigation and scientific writing. It is also important for students to be transparent about how they generated their work. Consider how transparency might be relevant for your assignment. For example, in the case where genAI is acceptable, you may ask students to provide the prompts they used to generate output, or steps they took to verify that the information in their paper is correct.
- **Require accurate and verifiable citations.** Ask students to include links to the citations they used for the written product (if you are requiring them to use primary sources).
- **Ask your students to critique the technology.** Consider a discussion activity where students appraise genAI output, considering what the technology does well and what it does poorly, as well as other benefits and drawbacks of the technology.[314]

- **Add metacognitive exercises to assignments.** Assign reflections asking students to articulate how they understood and responded to writing feedback from a technology (similar to the example activity in this chapter). This exercise supports students' critical thinking skills.

Related Open-Access Resources

- Use university teaching and writing center websites to identify materials on teaching with genAI. For example, Harvard University offers excellent and freely available information on teaching with genAI on their website.

Instruction Planning Ideas

- Engage in the Brave New Words three-step process and then develop your technology guidance in accordance with your unit and institutional guidelines.
- Try completing your own assignments using genAI technology (including new technologies as they arise) before distributing it to students to gain an understanding of how the technology can perform on your assessment.

Chapter 9: Engaging Students With Feedback That Promotes Agency and Development

Providing writing feedback, in many ways, is at the heart of the support an instructor or mentor offers to help a trainee move forward with their paper and become a better writer and thinker overall.[88,315] While instructors in the sciences often worry they do not have the training to provide effective writing feedback,[14] with a bit of guidance, this skill can be learned and evolve through usage.

Below, I summarize recommended practices for providing engaging, respectful, and clear writing feedback. A sample excerpt from a student paper is provided and sample feedback is shown throughout this chapter to demonstrate various recommended approaches. These approaches reflect that feedback is part of the social connectedness of writing, as well as the social and power dynamics that play a role in how we communicate and how students respond to our feedback.[6,21,23,95] Another important aspect of providing feedback covered in this chapter is the need to align our feedback with the revisions we want to see and with our learning objectives for the assignment and class. I have attempted to incorporate both big-picture approaches to consider as well as practical strategies for success. Two reflective activities are provided at the end of the chapter to help you consider the type of feedback you typically provide and how it may or may not be helping students grow as writers (strategies for working with second language speakers are highlighted in Chapter 4).

Orienting Your Comments to Your Course, the Assignment, and the Stage of Writing

Richard Straub suggests some key strategies for shaping feedback to the larger context of writing,[200] and I have summarized three particularly relevant pieces of advice here. First, review the student's text in terms of its rhetorical context. How well does it meet the readership? Does it achieve its intended purpose? Is the style appropriate to the type of writing? Second, Straub reminds instructors to tie their comments to the content they have been covering in class. The learning objectives you have set for your class and the assignment should be a key anchor point for feedback.[94,200] Starting a commenting session by reviewing class content, assignment objectives, and the rubric can help keep these fresh in your mind as you respond to your students.

Finally, Straub suggests that instructors tailor their comments to the needs of each individual student. Different feedback approaches work better for different writers and in different contexts. As Straub stated "It's not the paper in front of us, after all, that we're teaching."[200] In other words, we are teaching students, not papers. For example, providing comments to a doctoral candidate in their final stages of research will likely be more sophisticated in complexity compared to the feedback given to a first-year master's student.

Orient your comments to help the writer make revisions appropriate to their writing stage.[90,92,200] Rather than identifying everything that is wrong with the paper, limit your comments to the major changes you want to see in the next revision. Staging your comments to meet each stage of writing (these stages are discussed in Chapter 5) will help a writer focus on deeper issues first, and details like editing in the final stage.[87] It will also help you to limit the amount of time spent on giving feedback. Figure 9.1 portrays feedback working at a deeper level, including on ideas, content, and arguments,

which should be prioritized at the earlier stages of writing, and surface feedback, such as formatting, punctuation, and grammar corrections, which can be addressed in the final stage. If you have limited time to provide feedback, consider prioritizing the type of feedback that aligns with your learning objectives for the assignment and class. This type of feedback is likely focused on deeper issues, shown in the figure near the submarine.

Figure 9.1. Depiction of deeper feedback on ideas, content, and arguments, versus surface feedback on formatting, punctuation, and grammar.

Limit the number of comments in each draft to avoid overwhelming the trainee. The sample global comments near the end of this chapter (Box 9.5) highlight just three

areas where the student needs to prioritize in their revision: providing more background information, reconsidering how some of their text fits with their research objectives, and clarifying certain passages of text.

Encourage Writer Engagement and Agency

As an instructor, you may have developed your own style of commenting to students; however, many of us have not had the opportunity to stop and reflect on our tendencies and how our comments may be impacting student development.[316] According to Nancy Sommers, a writing feedback expert, the main purpose of responding to writing is to promote students' authority and authorship.[88] We can accomplish this by giving them feedback about their strengths and limitations as writers.[88]

Of course, providing feedback is not a simple endeavor; part of the complexity is that helping writers develop is not just a one-way communication: it is a multi-faceted interaction between instructor and student.

This interaction is made even more complex by the power dynamic that exists between instructor and student.[21] Instructors have the power to assign grades and they also wield more power due to their greater mastery of writing and content expertise. This power differential, according to Ken Hyland and Fiona Hyland, can dull students' critical thinking,[23] as following directives from an instructor without critically evaluating or even questioning the guidance deprives them of the opportunity to grow as writers.[23,200]

This dynamic can be further magnified if the feedback an instructor provides is written in a highly directive manner. For example, it may occur to an instructor while reviewing a paper: "Figure 2 is unnecessary and should be deleted." Relaying feedback to a student in this directive manner deprives them the opportunity to reflect and make a

judgement about how to revise their writing.[21,88,94,316] Second language speakers— at least in early stages of writing development— may be even more likely to accept writing feedback without questioning it, or even fully understanding it, because of this power dynamic and due to uncertainty about whether a comment is guiding them to correct an error or is simply a stylistic suggestion.[23]

Ann Blakeslee acknowledged this power imbalance, asserting that instructors must relinquish some authority to provide students with adequate writing experience.[37] One way to do this is to respond as a reader or even ask a probing question. For example, an alternative way to communicate the concern about the figure is: "How does Figure 2 tie in with your research objective to X?" This approach puts the student in the position of reflecting on their work, identifying if a problem exists, and then deciding how to address it. This process can help writers feel empowered when revising their work.[21,88,94,95] It is important to explicitly share with students that feedback is a two-way exchange, and that your comments are provided with the expectation that they will reflect on them and decide what to do with them in revising their draft. This may not be obvious to all students, and it is important to give students "permission" to use their agency in reflecting on and responding to your feedback.[21,88,94]

In other cases, it may seem that students are not responding adequately to instructor feedback or possibly are even ignoring it altogether. Although a lack of responsiveness has been attributed to the "Ikea effect"[317]— when students have invested so much time and effort into a draft, they don't want to change it— a range of factors could actually be at play. According to Murad Abdu Saeed's investigation, students tend to ignore feedback for three reasons: they don't understand a comment, they are unwilling

to follow it, or they don't know how to implement it.[97] There is strong evidence that writers often don't understand written feedback provided on their papers.[93–95]

Jumping ahead in the revision process, one strategy that helps to address both power imbalances as well as lack of understanding of comments is requiring students to submit a coversheet with their revision.[21,23,88,97] In a coversheet (described in Chapter 1), a writer is typically asked to briefly summarize (200-300 words) their approach to revision in the draft they are submitting. An instructor or mentor can ask a writer to include different information depending on the assignment, goals, setting, and trainee population (see Box 9.1 for sample information that can be included in a revision coversheet).

Research has shown that required coversheets encourage students to identify and clarify feedback they did not understand, rather than just ignoring it.[97] They also provoke thought and critical reflection about an instructor's comments and the process and decisions a student made in response to them. You can ask students whether they disagreed with any of the feedback and why, further promoting their own agency in the process and allowing for their autonomy in the development process.[88] This process aligns with the view that feedback should be a conversation.[88,95] Students can also be encouraged to articulate when they do not understand a comment (either in the coversheet or ideally earlier in the revision process) to encourage them to clarify your feedback as needed.[316] Regardless of what information is required, coversheets engage students to respond to (and clarify) feedback, resulting in them participating more fully in the process and establishing feedback as a two-way conversation promoting writing and writerly development.[88]

Box 9.1. Assignment Idea: Coversheets to Help Ease Power Imbalances and Engage Students in the Process of Revision

Consider asking students to include a coversheet with their revision, responding to your and/or peer comments. The coversheet can require students to include information such as a description of the biggest changes they made in their revised draft, as well as which feedback was most and least helpful (and why). If a student understood a comment but disagreed with it or felt something they wrote was misunderstood, they have a chance to more fully engage in the feedback exchange and address the issue. Signaling to trainees that feedback is more of a two-way exchange rather than a required prescription for their revision is helpful in supporting their agency.[21] To assist with time management in reviewing the coversheets, consider asking students to highlight any questions they have in yellow.

Jumping even further ahead in the revision process, another strategy to improve the understanding and connection regarding the student revision process is meeting with a writer after you provide comments on their draft (or simply make it known that you are available to meet with students if they have questions or want to clarify any comments). Brief student conferences are recommended by writing pedagogy experts.[21,23,93,96] Instructors may use one class period to meet briefly (5-10 minutes) with each student to avoid the hassle of scheduling individual meeting times. Workshop leaders of multi-day events may decide to meet with a few participants each day; for example, immediately after each day's session ends.

One additional option for feedback that has been shown to be helpful for students in better appreciating the intended meaning of instructor comments is the provision of

feedback in audio format, either in combination with or instead of written feedback. While some instructors may be drawn to this approach, it will not be a good fit for others. Box 9.2 provides a brief description of this approach to help you consider whether it might be worth trying, given your setting and style.

Box 9.2. Teaching Tip: Give Audio Feedback Instead of or to Supplement Written Comments

Why give audio feedback:

- Students have reported preferring audio feedback because it feels clearer and more personal than written feedback. It is easier for students to grasp the content and intended meaning of an audio comment.[318] Furthermore, students can review their text while listening to the content and are able to hear tone and nuance in their instructor's voice that may come across as harsh on the page.[319] An instructor's voice and tone can also help students better interpret the meaning and significance of a comment.[320]

Limitations of audio feedback:

- Audio feedback can help you convey feedback on three or so issues. While it can provide a rich context and helpful nuance, it will be too overwhelming to an instructor[321] and too much for students to process detailed feedback on the entire paper with audio feedback. Thus, some instructors[322] and students prefer audio feedback paired with written feedback.[319]

Suggested tips for giving audio feedback:[320]

- *After reading the document, make notes on two to three main issues.* Audio feedback works best for addressing a maximum of three concerns.

- *Keep your audio feedback to 5 minutes or less.* Longer feedback can be overwhelming to students and is labor-intensive for the instructor.
- *Start with a personalized introduction.* Begin your recording with a short, personalized (use the student's name) greeting[322].
- *Share how you have structured your audio feedback.* Provide insight on how your feedback is structured. For example, if you typically start with strengths of the writing and then move to suggestions, share this with your students to help them prepare for and process the information effectively.

Finally, to further support students in using all possible resources to help them think through and revise their drafts, point them to additional writing resources such as a writing center and/or English language support center if available.[315]

Commenting in a Conversational Way

Building on the previous section that emphasized writing feedback as an exchange, this brief section encourages commenting using conversational language. In Chapter 1, I described Nancy Sommers's suggestions to create a conversational feel when responding to student writers. She recommended avoiding what she calls "hieroglyphics," such as symbols or abbreviations like "AWK" (implying something is "awkward") used in the margins of papers to represent comments that trainees may struggle to understand,[89] and instead using everyday language.[88] Others also recommend this simple language approach.[323,324] This type of conversational commenting style encourages the view that writing instruction is embedded in social relationships.[6] It also highlights that we are responding to someone when we provide feedback and that it is an exchange; it also helps students to pick up on the gestures and tone in our comments. [88,323,324]

In the next sections, I address additional considerations for commenting including being specific and maintaining a respectful and supportive orientation. In the last section, I bring it all together, presenting a sample format for commenting based on recommendations from writing experts.

Being Specific

Writing abstract comments without concrete examples can make it impossible for writers to understand and apply your feedback to improve their papers.[88] Even if a writer understands the gist of a comment like "needs to be more concise," this comment alone may not be helpful because a writer may not understand how to implement the advice.[76] Tie each global summary comment (described near the end of this chapter) to one or two marginal comments specifying examples from the writer's text explaining how to apply your advice.[200] If there is no constructive reason for a comment, refrain from commenting.[145]

Positive comments praising a writer's strengths should also be specific.[200] Comments like "This is a good start" or "Nice work" are not specific enough to show that you noticed what the writer is doing well. Instead, point to something specific that you consider a strength such as, "You do a great job setting up your research aim in your introduction section."

Sometimes it may not be possible to provide specific advice because the writing is not clear or because you need more information before formulating your comment. In this case, it is appropriate to respond as a reader. For example: "I didn't understand your point here," or ask a question: "How does this paragraph relate to your overall claim of X?" This will prompt the writer to reflect on your statement or question, often spurring a

revision that addresses the underlying issue.[95] A sample comment demonstrating specific feedback is shown in Box 9.3.

Box 9.3. Applied Example: Excerpt From Student Paper and Instructor Comment

Excerpt from paper:

"The current understanding of the burden of dengue is limited due to varying types and quality of surveillance activities throughout Ecuador. Accurate, country-wide surveillance of dengue in Ecuador has been complicated by the emergence of other diseases carried by *A. aegypti* including Zika and chikungunya, which first appeared in 2016 and 2014, respectively."

Instructor comment:

"Your argument that understanding of dengue is limited due to varying types and quality of surveillance will be stronger if you elaborate a bit more and provide concrete examples (with citations) of what you are referring to here. In what way has the emergence of Zika and chikungunya compromised dengue surveillance? Through competing budgetary priorities, trying to stay on top of all three diseases? Also, can you be more explicit in describing how varying types of surveillance have limited understanding of dengue burden, transmission, etc.? How has the quality of surveillance been limited, specifically? For example, is it patchy throughout different parts of the country, are certain populations getting overlooked, is the quality of the surveillance approach lacking? Or is it less frequent than it needs to be?"

Being Respectful and Supportive

Writing can be a humbling and even demoralizing experience for writers at all career stages. Comments that don't address a writer as a person can make the writing process even more challenging and can even inhibit a writer from making progress.[72,325] For novice scholars in particular, negative reviews may be devastating.[326]

According to Sommers:

> Tone is the essence of a comment; how we phrase a response is as important as what we say. The same comment can be phrased in different tones and often makes the difference between students feeling dismissed and insulted and students feeling respected and taken seriously. [88]

All types of comments, even those that identify problems, can be phrased in a supportive—or at least neutral—tone. For example, consider a scenario in which you are tempted to tell the writer: "The paper felt disorganized and all over the place." You can, instead, let the writer know that their paper will benefit from reorganization to help the reader better follow the rationale and justification for their research inquiry. Being specific, discussed above, can help you be more respectful and supportive as well. This is because it directs the energy of the comment toward the nature of the problem and how to address it rather than into the emotional negativity of the critique.

Providing feedback on a writer's strengths is also a key aspect of recommended feedback approaches.[88,200] Some may ask: Aren't the so-called "negative" comments (which highlight problems and make suggestions) the most helpful for writers to grow because they help the writer understand how to improve their paper? Both types of comments—praise and suggestions—help writers. Praise helps writers understand what

they are doing well and can boost their confidence and morale. While highlighting problem areas and making suggestions to address them is a critical component of feedback, praise helps writers understand what they are doing well and can boost their confidence and morale. In fact, research shows that while a negative climate may stifle learning and performance, building on a writer's success and supporting their confidence can improve their learning outcomes.[84,327] Sharing encouragement and genuine interest in a writer's work can energize them and keep progress moving forward.

Leading your feedback with specific praise will help you maintain a supportive stance and buffer comments about problem areas. This approach has been shown to be helpful for writers' morale.[327,328] In the sample feedback in Box 9.4, the global comments are enthusiastic about the writing, its potential, and point out some key strengths of this writer's draft. Encouragement is especially needed for early-stage researchers and those with less writing experience.[329] This can be along the lines of "I am looking forward to seeing this in print!" or "I learned something new from reading this paper!"

Box 9.4. Applied Example: Global Comments on Student Draft

Dear Marcia,

You have done a great job with this introduction— it has all the necessary components, including pointing out the importance of your topic, describing what is known, identifying gaps in knowledge, why it's important to fill the knowledge gap, and posing your research objectives. Further, your research objectives tie in a number of interesting concepts and methods, which is part of what will make this paper novel, interesting, and impactful. However, efficiently explaining the background to set up your research objectives in a

short space is certainly a challenge! Below, I have flagged some areas in which providing background information will help fill your readers in on concepts they might not be familiar with. I also have inquired about how some of your text fits with the big picture/your research objectives to help you think through which content is most relevant to include to set the stage for your research objectives. Finally, I have commented where certain passages of text were not clear to me. Addressing these three issues will really transform your introduction. Please see my margin comments for more details and a few other comments. Keep up the good work. I am excited to see the next draft!

Sincerely,

Dr. Ramirez

Bringing It All Together—Suggested Structure for Commenting on Student Papers

Summarize Global Concerns and Tie Them to Specific Examples

Summarize global concerns at the top (or bottom) of the paper or on a separate page and highlight specific examples of each global concern with comments or revisions to relevant areas of the text. Giving examples of each global concern helps writers understand the big-picture comments and it also helps you avoid getting bogged down in details by keeping your focus on identifying and articulating the big-picture issues.[200]

In the sample global comments on the example paper (see Box 9.4), three major areas for the writer are flagged. First, the writer discussed some concepts the readers of their target journal are unlikely to be familiar with and the comments suggest that the writer provide background information explaining them. Second, the writer is asked to evaluate whether and how certain passages fit with the big picture and their research

objectives, with the goal of encouraging the student to think through which content was most relevant to set the stage for their research objectives. The final comment indicates that certain passages of text were not clear. In the marginal comments, specific examples are flagged for the writer's consideration. Additionally, as Sommers recommends, the global comments are addressed to the student with a salutation and signed by the instructor.[88]

In Box 9.5, a structure for feedback on student papers is presented. This structure incorporates recommendations offered in this chapter.

Box 9.5. Teaching Tip: Suggested Format to Organize Effective Writing Feedback

Global summary comments (disaggregated from the paper text, e.g., at the top of the first page or in a separate document):

1) Summarize strengths (be specific)

2) Summarize a limited number of problems. Where possible, focus on patterns.

3) Offer recommendations for revision, prioritized by importance or other logical ordering.

Marginal comments (attached to specific passages of text):

Highlight one or two examples of issues described in the global summary comments, followed by a suggested revision where relevant. Provide other specific comments or reactions to text. Offer comments, questions, and suggestions that are appropriate to the stage of development.

Instruction Planning Ideas

Two activities below encourage you to reflect on your commenting approach to evaluate whether it is doing the work you want it to:

- Activity 1: Review your comments on one or a set of student papers, classifying them according to your rubric, assignment, or class learning objectives. Ask yourself what students will learn from your written comments and how your comments will teach these lessons.[88]
- Activity 2: This is the most elaborate activity in the book; it asks you to compare your written feedback on one or a few student papers against the "Degrees of Control" reflective model (explained below) to get insight on the work your commenting approach is doing. This model, based on the work of Richard Straub as well as the work of Straub and Andrea Lunsford (and adapted by Russell Sprinkle),[316,330] helps instructors identify the degree of control their comments exert over student writing.

While there is no precise formula for responding to student writers in terms of the content of the comments or the proportion that are more or less directive, it can be helpful to become aware of such tendencies to open up the possibility of making adjustments. The goal should be striving for balance; when students see themselves as engaged in two-way dialogue with an interested and encouraging responder (as opposed to a harsh and critical grader), they become more receptive to feedback.[21,95,316] A balanced approach to commenting that avoids asserting a high level of control over a writer's text can encourage students to become more engaged in their revision process. It also signals respect for writers' approaches to developing their text and creating meaning.

According to Sprinkle, control is not always counterproductive:

> …rather, it suggests that decisions about how much control to exert over students' texts are almost always contextual, thus requiring informed judgment about strategics for making written commentary. Effective use of the degrees of control reflective model can help instructors to acquire and implement such judgment when making written commentary.[316]

The Degrees of Control reflective model is organized into categories and subcategories in Table 9.1 and the categories are defined below the table. Classify each comment into the corresponding category and then reflect on the distribution of your comments, striving for balance.

Table 9.1. Categories and Subcategory Organization for the Degrees of Control Reflective Model

	Firm control		Moderate control		Mild control	
Comment number	Corrections	Commands	Qualified evaluations	Advice/ suggestions	Questions	Reader response
1						
2						
3						

Adapted from: "Written Commentary: A Systematic, Theory-Based Approach to Response" by Russell S. Sprinkle (found at: https://publicationsncte.org/content/journals/10.58680/tetyc20043012

Category definitions:

- Corrections indicate mechanical errors, including minimal marking, correction symbols, and editing.

- Commands tell the writer what to do or write; for example, “Add a citation to support this claim” or “Move your research objectives to the end of the introduction section.”
- Qualified evaluations are comments that use qualifiers to moderate the authority of the instructor and suggest less control; for example, “This might not be clear to your readership because physicians don’t always have access to public health training” or “This claim does not appear to be supported by the current literature.”
- Advice/suggestions are comments that suggest editorial changes; for example, “You may want to double-check that all results have a corresponding methods description in the methods section” or “My suggestion is to go back to your first choice for a target journal.”
- Reader responses are comments that show an understanding of a writer’s purpose and engagement with the text or attempt to create identification with the writer; for example, “I can tell you are very passionate about this topic.”
- Questions ask real (not rhetorical) questions; for example, “Is this association true in both men and women?” or “How might you address objections to this argument?”

Chapter 10: Strategies for Making Student and Professional Collaborative Writing a Success

This chapter begins with advice for instructors assigning collaborative writing in their classrooms. The second part describes principles and tips for guiding mentees with successful professional collaborations that lead to publication. Material in this chapter may help you guide trainees who are collaborating in a class and/or preparing a paper for publication in an academic journal.

Collaborative Student Writing Assignments

Collaborative Writing in the Classroom Has Benefits and Fulfills an Unmet Need

Collaborative projects help students develop skills that can improve their ability to work successfully in diverse teams, which makes them more desirable to employers.[331] Collaborative writing projects that ask students to produce document types used in the workplace help them learn how researchers collaborate on publications in the professional realm. Even for students who are not planning to publish their papers, choosing a target journal and following its author guidelines can raise questions about collaborative authorship that allow students to deepen their professional knowledge.[265,332] For example, learning the criteria for authorship and the roles and responsibilities of authors prompts reflection about how knowledge is created through the publication of research in academic journals.

This type of assignment also fulfills an unmet need, as health sciences students have expressed a desire for training and activities on authorship.[333] As an additional benefit, collaborative assignments may also save instructors time, as they result in fewer papers requiring feedback and grades.

Strategies for Assigning and Supporting Collaborative Projects

Begin planning a collaborative assignment by reflecting on your goals for your course and the assignment. Your scaffolding[5] and assessment approach should be guided by these broader goals. For example, if you want students to learn teamwork skills and how to effectively organize and execute collaborative writing, the assignment structure and process should help students achieve these goals. It's important to define collaborative writing for your students early on and to be explicit about your expectations up front. This can help head off a situation in which students work in parallel and turn in a product that consists of separate sections written simultaneously that are simply pasted together. Emphasize the importance of coherence and connectivity of the final product, and devise a process that will help them achieve this outcome.[334] Giving a single grade on the written product for all team members also reinforces that the product should reflect the collaborative and dynamic thinking of the entire group.[335]

It is important to recognize that students may be wary of collaborative assignments due to bad experiences they may have had in the past and because of their relative lack of control over their grade compared to an individual assignment.[336] Starting with a discussion about the project and sharing the benefits of collaborative writing projects early on can help students understand how the assignment fits with the course goals and how it may benefit them. Providing clear expectations for collaborative behavior and for the final product can help prevent problems before they occur, making the activity easier for everyone.[337]

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[5] Scaffolding refers to a process wherein instructors provide students supports for learning early on, and then gradually remove the supports as students learn the material (Ambrose).

One big difference between a collaborative assignment versus an individual paper is the burden of logistics.[338] Collaborative assignments require students to find time to schedule meetings outside of class. They must decide on a meeting format (in person or virtual), their writing software application, how they will organize versions of their paper, and who will write what. Students may not anticipate all of these decisions and realizing that their group is not on the same page partway through the assignment can cause major frustration.

To help students through the planning process and avoid frustration, you may ask each group to submit a work plan specifying how and when they will meet, who will complete what tasks, and how they will exchange drafts or files.[337] A sample of this form that can be modified to suit your group's needs is included in Box 10.1.

Box 10.1. Activity Idea: Assigning and Managing Collaborative Writing Projects: Sample Group Work Plan

Group Work Plan (please turn in only one copy of this form per group)

Note: At the end of the term, I will ask each of you to complete a checklist evaluating whether or not each person in your group did what they agreed to do. Each student's grade may be higher or lower than the general group grade, based on peer assessments.

1. Group members (list names in alphabetical order).

2. Will different people take different roles on this project, or will the group do all research, develop visual elements, and participate in writing collectively? If you plan to take different roles, who will do what?

3. When (what days and times) and where will you meet to work on your paper?

4. How will you share text and data with one another? (The course website? Dropbox? Google Docs? Some other method?)

Adapted from: https://lsa.umich.edu/content/dam/sweetland-assets/sweetland-documents/teachingresources/AssigningandManagingCollaborativeWritingProjects/Supplement1_GroupWorkPlan.pdf

Requesting a progress/problem report partway through the project can also help you to monitor progress and any problems that may arise.[337] Students can also learn quite a bit from each other during the writing process, as outlined in the Box 10.2.

Box 10.2. Teaching Tip: Approaches to Help Students Learn From Themselves and Each Other

- Ask students to read previous students' advice for them in completing the assignment.[339]
- Provide access to other groups' in-progress papers (e.g., in an online shared document) so they can learn from each other.[334]
- At the start of the semester, discuss what makes an effective team. Later in the term, ask them to compare their list to their own team's performance/interactions.[339]

Building Diverse Teams that Enhance the Student Experience

Working with a diverse group has many demonstrated benefits in terms of better critical thinking and problem solving,[331] increased creativity,[331] and better overall performance.[340] In fact, employers highly value employees' ability to work with those from diverse backgrounds.[331] But what exactly does a diverse group look like? It will

certainly look different in different locations, but can include balance with respect to gender, race/ethnicity, expertise, social background, and other characteristics.

It is also true that working with diverse groups can be challenging. It is often less comfortable compared to groups that are more similar and can foster a lack of trust. Research suggests that more diverse groups may have less cohesion and more challenges to communication.[150] It is perhaps for this reason that students (and people in general) tend to gravitate toward collaborating with those who are similar to them.[341]

However, to capture some of the benefits that diversity brings, you may decide to intentionally create diverse student collaborative groups.[151] To do this, you can start by making the rationale and process explicit, by presenting evidence on the benefits of collaborating with a diverse group, and then facilitate a discussion about what a "diverse" group looks like in your setting. From there, students can be placed into groups that are balanced based on the qualities they identified in the discussion.

Prevent and Manage Problems Arising With Group Work

Perhaps the biggest concern for students assigned a group project is "free-riding,"[336,338] where someone lets others in a group do all the work.[336] Three strategies to prevent and manage this problem can help, and all three could be presented to students at the beginning of the semester to discuss and decide whether one of them might be a good fit for the assignment.

The first strategy involves asking students to document the contributions of each group member on a form provided by the instructor. A key step is to review the process and form with students first, so everyone is clear about the process. Putting this process in place helps deter free-riding, allows students to feel they have a voice in the process,

and offers a mechanism for you to consider group member contributions when assigning grades.[337] The form can be short, providing space for each student's contribution, or it can be more detailed with space to comment on contributions in different areas.

Box 10.3. Activity Idea: Ask Students to Answer the Below Questions to Help Them Prepare for Their Collaborative Writing Project (Modify the Questions as Necessary)

Sample Assessment of Individual Contributions to Group Project[337]

Your name: _____

Group member's name: _____

Please rate this group member's contributions in the following areas using the following scale: (1=poor/never - 5=excellent/always)

1. Contributes ideas: 1 2 3 4 5

2. Encourages others to contribute ideas: 1 2 3 4 5

3. Offers useful feedback: 1 2 3 4 5

4. Attends meetings on time: 1 2 3 4 5

5. Completes their contributions in a timely manner: 1 2 3 4 5

6. Treats fellow group members respectfully: 1 2 3 4 5

7. On the back of this form, please describe your own contributions to the group (use the same criteria as above)

8. Is there anything else you want me to know?

Adapted from: https://lsa.umich.edu/content/dam/sweetland-assets/sweetland-documents/teachingresources/AssigningandManagingCollaborativeWritingProjects/Supplement2_AssessmentofIndividualContributionstoGroupProject.pdf

The second strategy, published by Caple et al,[334] involves tracking student contributions in a shared online word processing software (such as Google Docs). In this approach, which has been well received by students, group members receive a grade of zero if they have not composed or edited any text in the shared document.[334]

The third strategy, also well-liked by students, is the "You Are Fired!" method published by Abernathy.[336] In this approach, one member of a collaborative group may be "fired" (resulting in no credit for the assignment) from the group if they do not contribute. In order to fire a free-riding group member, other members must complete a two-step process. First, another member of the group must email the free-rider by a certain date, citing a) the specific work that they are not doing and/or meetings they are not attending, b) the due date for the required work (or the meeting they must attend), and c) the instructor must be CCd. Second, if the free-riding student fails to turn in the required work and/or attend the required meeting by the due dates, another group member emails them notifying them that they are fired (again CCing the faculty member).

Mentorship for Professional Writing

Mentoring trainees who plan to publish their work on authorship roles and expectations will help them navigate this territory and avoid problems. Key topics to consider covering are strategies for building a strong author team, keeping the team functional, and collaborative writing. Discussing power dynamics and authorship disputes will also help prepare your students for what may lie ahead on their journey toward publication.

A good place to start with trainees embarking on a publication is a review of standard authorship guidelines such as the International Committee of Medical Journal

Editors (ICMJE)[342] guidelines. These guidelines recommend that authorship be based on the following four criteria:

- Substantial contributions to the conception or design of the work, or the acquisition, analysis, or interpretation of data for the work; AND
- Drafting the work or revising it critically for important intellectual content; AND
- Final approval of the version to be published; AND
- Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

In addition to being accountable for the parts of the work performed, each author should be able to identify which coauthors are responsible for specific other parts of the work. Authors should also have confidence in the integrity of the contributions of their coauthors. Though more junior researchers will not always have the power to veto specific authors from participating, introducing trainees to the ethical implications of including guests, ghosts, and token authors will help them understand what types of authors should be avoided. "Guests" are thought of as those who appear on the author list but did not meaningfully contribute to the paper, and "ghosts" are those who contributed but are not listed in the author list.[343] Token representation should also be avoided, wherein authors are included in the author list to show representation but are not given the opportunity or training to meaningfully contribute to the paper.[344,345]

Finally, artificial intelligence technologies such as ChatGPT cannot be held accountable for their contributions and trainees should be made aware that genAI technologies should therefore not be included in an author list.[309]

Strategies for Successful, Productive Collaborative Writing.

Key strategies covered in this section include building a good team, defining clear roles, using good communication, and organizing the process. Other sources cover these topics in more detail.[343,346]

Help Your Mentee Understand the Process of Building a Team.

Your mentees will likely not be involved in every aspect of the publishing process from team building to correcting the final page proofs and promoting the paper, but it's important to familiarize them with the entire process from beginning to end.[265,347] When possible, mentors should involve their mentees in as much of the process as feasible to provide guidance along the way.[333]

To start, mentees should be aware that a good author team involves one with the range of expertise necessary to cover the different aspects of a paper (e.g., methods, content, etc.), and one that will be productive and functional.[346] You may share with your mentee that while being inclusive is important, inviting too many coauthors can make the process difficult to manage. The goal is to include all who participated meaningfully in conducting the study and for all authors to make substantial contributions to the paper.[344] Considerations that can be shared with a mentee regarding developing the author list are described in Box 10.4. Finally, the mentee should be aware that the author list is not set in stone and that roles can change and coauthors may need to be added or removed at a later stage.[343] For example, if an author is unable to fulfil some or all of their role, they may need to be moved in the author list or removed entirely.[342] In some cases, a new author may be added to address a need partway through writing or the revision process.[343]

Identifying a writing team coordinator who manages the process and keeps progress moving forward is a good idea.[346] The coordinator organizes author contributions, manages revisions, and keeps the group updated on the manuscript's status. If the coordinator is not the senior author on the paper, they may need to consult with the senior author to make decisions.

Help Your Mentee Understand the Importance of Clear Roles, Good Communication, and Process.

Early on, roles, author order, and the timeline should be discussed and agreed upon by the group, with the acknowledgment that adjustments might be necessary if things don't go as planned. Documenting these and other key decisions (see Box 10.4) on the title page of the draft manuscript where all authors can see the information will help to avoid misunderstandings.[343]

Familiarize your mentees with common authorship problems and disputes[347,348] to help them prepare to navigate professional scenarios like not getting the authorship position they anticipated. Discussing power differentials between senior and junior authors and strategies to prevent and manage related issues[333] will help them professionally and will create more equitable opportunities for the author team.[248] Communication is a key part of preventing misunderstandings. For further in-depth strategies for addressing author disputes, see Albert & Wagner[343] and Dance.[348]

The team should decide who will serve as the corresponding author. This person typically submits the manuscript and manages correspondence with the journal and is often the senior author.

Box 10.4. Activity Idea: Using the Prompts, Ask Trainees to Consider the Roles and Tasks for Their Author Team to Help Them Organize the Work

- Decide on author order (first or co-first, second, last or co-last, and middle).[6]
- Decide who will manage citations, write the abstract, submit the paper, write additional text such as a "so what" summary box? Who will write the cover letter? Who will coordinate a response to reviewers and any required revisions? What is the plan for version control?
- How will the authors communicate with one another? Via email? Slack? Will regular author meetings be held to discuss progress and questions?
- Identify common terminology for the paper (for example, you may need to distinguish panel data from longitudinal data and decide which term to use).
- Decide what software you will use to manage citations.
- Discuss where you plan to submit the paper and review the journal's core readership and author guidelines. Does the journal require you to suggest reviewers? Will you have the opportunity to identify the names of anyone who you do not want to review your paper?
- Discuss the preferred approach for providing feedback to each other on drafts. For example, are big picture comments or detailed edits preferred? Do you want people to comment only in comment bubbles or use track changes right in the text? This can be the difference between saying "this needs some examples" and actually adding suggested examples. The approach might depend on the

[6] Co-first and co-last authorship is acceptable at many journals, and this can expand the opportunities for these highly important author positions.

relationship between coauthors (senior author to a student or vice versa), but it should be discussed, regardless.[349]

Four Strategies for Organizing Collaborative Writing

Trainees will be more prepared for collaborative writing if they are equipped with a range of options for sharing writing duties. Below, I present four strategies for organizing the collaborative writing: single author first draft, parallel, sequence, and synchronous.[350] Writers may adopt any of these strategies depending on what works best for their team and, of course, writers may decide that a combination of strategies works best.[346] For all the below approaches, to optimize team dynamics and outcomes, a team coordinator, as described in the previous section, may be used. Different approaches may be preferred for writing the initial draft versus revising, and these should be discussed during the planning stage.

Single Author First Draft

This model is common for graduate students completing their master's or dissertation research. In this approach, one principal writer completes a first draft and revises based on feedback from their coauthors. Often, the person writing the initial draft is the first author and may also serve as the coordinator. However, this individual will not necessarily be the corresponding author (this role may be filled by the senior author). A major advantage of this approach is the initial draft may feel more coherent compared to an approach in which different people wrote different sections separately, as in parallel and sequence writing. A disadvantage is that this approach may be slower than other approaches depending on the experience level of the first author.

Parallel and Sequence

In parallel and sequence writing, authors divide the writing responsibilities. For example, one author may write the initial introduction draft, another may write the initial draft of the methods section, etc. The difference between the two approaches is the timing. In parallel writing, authors write simultaneously, whereas in sequence, they hand off their section to the next in sequence. The parallel approach is more efficient because writing a given section is not dependent on the timing of the previously written section. A disadvantage of parallel writing is that the authors don't see drafts of the other sections before their turn, so the first draft will be a bit less coherent than sequence writing.[350] Starting the parallel process with a group brainstorming and outlining session can help make the process more connected. Additionally, the group will need a strong coordinator to stitch things together, remove overlap, and integrate text. Sequence writing requires the group to decide what order to write the paper in. For example, the group may want to start with the introduction, then move to the methods, results, discussion, and, finally, the abstract and title. Alternatively, some groups prefer to start with the methods.

Synchronous Writing

Synchronous writing is scheduled in advance and involves collaborative writing in a shared document at the same time. For this approach to work, the team has to be available to meet for writing sessions. This may be more or less convenient considering the time zones and schedules of collaborating authors. The social support aspect of this approach is valuable, and scheduling regular sessions (e.g., once per week) can be helpful in making writing progress. Further, being together during the composition process can be helpful for questions that may arise during the drafting stage. This approach can also be valuable for editing once an initial draft is complete. Like the parallel writing

technique described above, a disadvantage of this approach is that the authors cannot build on what has already been written; to some, this can feel disorienting.

The Power and Challenges of Diverse Collaborative Author Teams

Diverse author teams are more likely to create better written products that are more highly cited compared to less diverse teams.[149][footnote [7]] Diversity may improve written products because it brings more perspectives to the table and fosters creativity.[151] Diversity also inspires group members to sharpen their thinking, improve their arguments, and clearly articulate their viewpoints in anticipation of having to explain and justify their views in a group that may not share their perspectives.[149,150]

Though international collaborations do offer the benefits of diversity, they are also fraught with power differentials and inequities.[7,351–353] Research in the Global South funded and led by researchers from high-income countries who reside outside the study country are particularly at risk for imbalances in decision-making power and credit.[7,354] This dynamic can compromise the writing process and the product.[352] Local researchers offer key strengths, including their ability to frame research questions and provide context and interpretation for the study results.[352,354] However, local researchers who contribute their expertise may not appear on the author list or may not appear in the influential first or last author positions.[7,351] Part of this complex problem is that local researchers may not have the same level of training as their counterparts in high-income countries.

[7] In one high-quality study, papers with authors in more locations, with greater ethnic diversity in their author team, were shown to get published in higher-impact journals and receive more citations compared to those with less diversity, even after controlling for the number of authors, the ethnic density of the groups represented in the author list, the publication records of the authors on a given team, and the size of the pool of collaborators of the authors.

Researchers who are part of an equitable collaboration[354] have the training and opportunity to be first and/or last authors on the resulting manuscripts.[344,345] Mentees engaging in these types of collaborations (particularly those from higher income settings) should be made aware of the disparities. All mentees should be familiarized with expectations for and pathways to making collaborations more equitable. Additionally, tools such as reflexivity statements (see example in Box 10.5) help author teams reflect on the processes that led to their manuscript culmination, including the ways in which equity was promoted in their collaboration.[345] The below questions are meant to guide the development of a reflexivity statement for collaborative teams that span countries with differing income levels.[345] They ask what authors from higher income settings are doing to support their collaborators from lower income settings to strengthen their capacity for research and publication. This information is required by some journal editors, but regardless of whether this information is required, author teams may benefit from considering the below questions. At the same time, it may be that not all the questions can be addressed (e.g., a small project with minimal funding) in each research context.

Box 10.5. Activity Idea: Ask Author Teams to Reflect on the Items in This Reflexivity Statement for Diverse Collaborating Teams

Study conceptualization:

1. How does this study address local research and policy priorities?

2. How were local researchers involved in study design?

Research management:

1. How has funding been used to support the local research team(s)?

Data acquisition and analysis:

1. How are research staff who conducted data collection acknowledged?

2. How have members of the research partnership been provided with access to study data?

3. How were data used to develop analytical skills within the partnership?

Data interpretation:

1. How have research partners collaborated in interpreting study data?

Drafting and revising for intellectual content

1. How were research partners supported to develop writing skills?

2. How will research products be shared to address local needs?

Authorship:

1. How is the leadership, contribution, and ownership of this work by low or middle-income country (LMIC) researchers recognized within the authorship?

2. How have early career researchers across the partnership been included within the authorship team?

3. How has gender balance been addressed within the authorship?

Training:

1. How has the project contributed to training of researchers from low or middle-income countries?

Infrastructure:

1. How has the project contributed to improvements in local infrastructure?

Governance: 1. What safeguarding procedures were used to protect local study participants and researchers?

Related Open-Access Resources

- Frassl MA, Hamilton DP, Denfeld BA, de Eyto E, Hampton SE, Keller PS, et al. Ten simple rules for collaboratively writing a multi-authored paper. PLoS Comput Biol 2018;14(11): e1006508. https://doi.org/10.1371/journal.pcbi.1006508
- Albert T, Wager E. How to handle authorship disputes: A guide for new researchers. The COPE Report 2003. https://doi.org/10.24318/cope.2018.1.1

Instruction Planning Ideas

- If you are currently using a collaborative writing assignment in one of your courses, where have students struggled in the past? Consider the strategies for assigning and supporting collaborative projects presented in this chapter. Might any of these make your management of student projects easier? Might any make the student experience more positive?
- If you are mentoring coauthors on an author team, consider where the sticking points are. Do some of your mentees struggle to provide clear and timely communication to the author team? Is meeting deadlines a problem? Identify whether one or more of the approaches presented in this chapter might help ease some of these sticking points.

Chapter 11: Mentoring Trainees to Develop and Publish Their Research

I now move to the idea of working individually with mentees. Although some of the lessons in this chapter may connect to your classroom teaching, think of this material as relating to the work you might do with graduate students, residents, post-docs, and other mentees individually as well as in small groups such as a lab or research group.

Critical approaches for mentoring trainees on communicating their findings in writing and publication have already been reviewed in some chapters. For example, three key approaches to mentoring were reviewed in Chapter 1: encouraging your trainees to join a community of practice, serving as a trainee's publication broker, and using mentor texts to guide trainees. A fourth key mentoring skill was covered in Chapter 9 on the provision of effective writing feedback. Finally, Chapter 4 addresses working with diverse writers and provides detail on guiding neurodiverse writers and second language speakers. Looking ahead, Chapter 12 on supporting the productivity of writers can help you identify strategies to support mentees who are struggling to make progress on their writing.

This chapter focuses on providing expectations and structure, getting to know your trainees, and working to support and retain vulnerable trainees. It also provides selected concrete strategies for supporting your mentees in developing and publishing their research. Finally, I highlight ways to address common challenges of mentorship such as how to be more efficient with your time.

Developing a Mutual Understanding of Your Expectations and a Trainee's Needs

Communicate the Importance of Writing and Your Expectations Prior to Agreeing to Mentor a Student

A central feature of successful mentoring relationships is communication. From your first meeting with a potential trainee, convey that writing is an essential aspect of the research process and a key part of working on research with you.[355] If publishing a first-authored paper is an expectation in your research group, make that clear from the start (before you and your trainee commit to working together). Describe the types of writing activities that your lab or research group regularly undertake to help the trainee decide whether working with your group will be a good fit.[355]

Get to Know Your Mentees

As anyone with mentoring experience can attest, trainees come with a range of goals and skills. Some want to publish their work as a steppingstone to an academic career, and others may wish to complete their research experience and move on to a job that does not involve research or academic writing. While some will have a strong grasp on the topic under study, others will be unfamiliar with your group's research area. Your trainees will also vary in their familiarity with academic writing and their skill in writing overall.

While mentoring individuals or small groups of trainees might seem daunting because of the lack of obvious structure, there are advantages compared to guiding students in a classroom setting. Because class sizes can be quite large in the health sciences (For many years, I taught a writing class of about 60 graduate students each fall!), it can be difficult to get to know each student. Working with individuals and small groups of trainees, on the other hand, allows you to get to know a trainee's interests, goals, skills, as well as their areas that need development. Understanding this information

is advantageous because it allows you to tailor your mentoring approach, leveraging your trainees' interests and strengths and help them build skills in their less developed areas.[355]

There are many surveys already available to help you assess your trainees' interests, goals, skills, and areas that need development and to monitor their development over time. At the end of the chapter, I list some publicly available individual development plans (IDPs), which are commonly used for trainee assessment and are frequently used to guide a trainee's studies and career development. IDPs are also helpful to the trainee and mentor in tracking progress over time; for example, revisiting the document two times per year.

Make Expectations Clear and Formal

A theme in this book is making expectations explicit in the classroom as well as through individual mentorship. It's critical to do this when initiating a mentoring relationship with a new trainee. Barbara Grant's supervision practice and feedback guidelines, described in her coauthored book chapter (with Xu Linlin),[356] are a good example of how a mentor might go about setting up expectations with their trainees at the beginning of their work together. In a cover letter that accompanies her guidelines, she describes her practice, emphasizing her commitment to helping students produce high quality work, while also encouraging them to be self-directed and to attend regular group advisee meetings. In Box 11.1, I share an excerpt of her feedback guidelines.

Box 11.1. Teaching Tip: Excerpt From Doctoral Feedback Guidelines (With Permission From Barbara Grant)*

1. I like to get writing from students as soon as possible and regularly. This can include responses to reading, outlines, short sections of chapters, or agreed writing exercises.

In this way, you can get into the habit of writing, which is essential for getting finished. You can also test out samples of certain kinds of writing, such as critical literature review, theoretical explanation, data analysis etc, and get feedback to help you strengthen them.

2. I only want to see a whole piece of writing (such as a draft chapter, thesis proposal, ethics application etc) twice, so choose carefully when you give it to me. (I will see chapters a third time when they come with the whole draft thesis.) Think about who else can read it along the way eg set up peer exchanges with other doctoral students.

3. Before you send in any writing for feedback, do these things:

• Ensure it is a good draft, ie you have reworked it at least once and applied a spell-check. This is so I don't waste time giving you feed-back about things you already know. Your draft can, however, include some lightly sketched sections (eg bullet-point lists), notes to yourself about finding references, or thoughts about whether or not you might include a sub-section on some issue etc – things that are unfinished (that you may even want feedback about) and that show me what you are thinking about.

• Include a running head with your name, the version number and date …and word count...

• Add page numbers.

• Write a cover email that:

o describes what stage you are at with the piece

o outlines what you've done to it since I last saw it (if this is the second time)

o outlines the key issues you'd like feedback on (*and* what you think is particularly strong/working well/you are happy with).

• Stop working on this piece of writing until I give you the feedback. Take a break from it, let me think about it.

4. When I get your work, I'll let you know by return email the date when feedback is likely by (this will be dependent on my other workload).

5. My fundamental practice is to point out, on the one hand, the strengths of the work so that you can build on them and, on the other, to highlight where I think it needs to be revised and/or edited etc (and sometimes how). *If I fall short on either of these things, let me know!* (Revise = restructure/rethink; edit = rewrite for clarity and elegance.)

6. Usually I will annotate the draft in pencil by hand and return it to you with an emailed cover-sheet summarising the key issues. I never use track-changes; sometimes I use comments.

7. Over time, you need to learn to be your own proofreader (at least to a certain standard) but I will guide you on these matters. Typically I will proof the first 5 pages or so of any piece I read for you – you need to learn from those corrections. Look around for others to help with proofing – members of your family, friends, fellow students.

Get feedback from peers and others

Your writing will always benefit from the feedback of others; it will also benefit through the process of you giving feedback to others on their writing.

**The guidelines begin by making clear that her expectations are not rigid, acknowledging that circumstances sometimes require flexibility.*

Provide Structure to Help Your Trainees Move Forward

The proportion of students wishing to publish who actually do publish is low,[357,358] particularly in less resourced settings[20,359]—though data on this topic are not complete. It is clear, however, mentorship makes a big difference in publishing success.[251,360–362] After talking with your mentee about their goals, strengths, areas for improvement, and your expectations, decide on goals and a timeline together.[355] Start with the end product and deadline and work backward to set deadlines for intermediate products.[76]

Table 11.1. brings together scholarship on strategies that are presented throughout the book so you may review and consider whether each might be a good fit for you and your trainees. The activities focus on helping your trainees learn academic and disciplinary literacies, developing a professional identity, and supporting them in publishing their work.

Table 11.1. Sample Mentoring Activities Based on Scholarship Described in This Book. Chapter Numbers, Shown in Parenthesis, Identify Where Corresponding Material Is Covered In This Book*

Goal	Activity
Provide explicit expectations and roadmap for training that you and trainee agree on	Meet to consider trainee's goals and expectations of mentor and agree on a timeline, meeting schedule, publishing goals/targets, and other expectations (11)
Learn disciplinary and academic literacies	Encourage trainees to join a community of practice (1)

Table 11.1. Sample Mentoring Activities Based on Scholarship Described in This Book. Chapter Numbers, Shown in Parenthesis, Identify Where Corresponding Material Is Covered In This Book*	
Goal	Activity
Learn to avoid plagiarism and use generative AI in accordance with institution and publishing standards	Discuss appropriate source use and plagiarism standards (2, 4), as well as generative AI technology use (7)
Support writing process	Familiarize trainees with appropriate reading and annotation strategies for different types of reading (2)
Help trainees be effective writers	Teach trainees rhetorical approaches to writing (3) and the typical structure of a scientific paper (Part 2); a "says/does" analysis of a mentor text from their target journal will support this work (2)
Keep trainees' progress moving forward and overcome writing barriers	Guide trainees on writing productivity strategies (12)
Help trainees mindfully plan their writing	Ask trainees to engage in process and content planning (5)
Support trainees in learning academic and disciplinary	Serve as "publication broker" (1)

Table 11.1. Sample Mentoring Activities Based on Scholarship Described in This Book. Chapter Numbers, Shown in Parenthesis, Identify Where Corresponding Material Is Covered In This Book*	
Goal	Activity
literacies and to help them navigate the publication process	
Support trainees' academic and disciplinary literacy skills	Familiarize trainees with authorship criteria, roles, and standards (10, 14)
Help trainees grow as writers and thinkers (and offset your own time demands)	Ask trainees to conduct a structured review of their own drafts and engage in peer review with a partner (4, 5)
Support your trainees' development, growth, and professional identity	Provide writing feedback and discuss it with them (7)
Promote deep engagement and agency in the writing process	Ask trainees to prepare a reflective coversheet with their revision that responds to the feedback provided and explains their revision approach (1, 5)
Promote trainees' academic literacy skills	Ask trainees to collaborate on journal peer review with you (11)
Promote trainees' academic literacy skills	Ask trainee to draft a cover letter for manuscript submission to a peer-reviewed journal (11)

Table 11.1. Sample Mentoring Activities Based on Scholarship Described in This Book. Chapter Numbers, Shown in Parenthesis, Identify Where Corresponding Material Is Covered In This Book*	
Goal	Activity
Support trainees' academic and disciplinary literacy skills	Mentor trainees through their responses to journal peer reviewers (part of the "publication broker" role; 1, 23)

*For supplementary planning resources, refer to the open-access resources at the end of the chapter

Additional Activities to Support Your Trainees in Developing Academic and Literacies Skills

Two additional mentoring activities are described in this section. First, creating a collaborative journal peer review with your trainee is described as an activity to foster academic and disciplinary literacy skills. Second, a brief description of mentoring trainees on writing a cover letter to accompany a journal submission is provided.

Collaborating on a journal peer review with your trainee helps to "demystify"[363] the publishing process[47] and helps to socialize them into the academic arena.[6,51,364] Working side by side with trainees during each step of a peer review immerses them into the academic community and it exemplifies "situated learning" because it provides trainees with valuable context, real-world activities and relationships from which to learn.[48] This type of side-by-side mentorship also helps trainees learn how to navigate problems or special circumstances as they arise.[16]

Box 11.2. Activity Idea: Mentor Students by Collaborating on a Journal Peer Review

Students learn a variety of important skills from peer review.[365] Some research even suggests that students learn more from providing a peer review report than from incorporating comments given by an instructor or peer![232] Collaborating with your trainee on preparation of a journal peer review exposes trainees to a valuable learning opportunity.[51,242,365] The work can be organized in a "divide and conquer" approach where you split up the sections and then compare your reviews, or by each conducting a complete review and then integrating the most relevant comments into a final review. Such collaborations are an excellent way to learn content, conventions, and professional norms. However, keep a few considerations in mind as you collaborate with trainees.[242] Inform your collaborating trainees that they should keep the manuscript confidential and refrain from entering the manuscript text into online interfaces, for example, generative AI. Consider asking your trainee to formally agree to this in a written contract. When submitting your review to the journal, be sure to acknowledge your collaborating trainee by naming them in the comments to the editor interface. Collaborating trainees should be listed as reviewers in open reviews.

Writing a cover letter is an important academic literacies skill that can help your trainees better understand the publishing system and publish their work; however, unlike publications, examples can be scarce. While not all journals require them, most authors include them with the understanding that they provide an opportunity to succinctly summarize the importance of their paper and why it should be published.[366] In Box 11.3,

I include standard elements that should be included in a cover letter[367–370] and below that, I offer an annotated sample of a cover letter (see Figure 11.1).

Box 11.3. Activity Idea: Ask Your Trainees to Write a Cover Letter for Their Journal Submission Using the Below Standard Cover Letter Elements [367–370]

- Address the editor by name and include the name of the journal.
- Include the title of your manuscript submission and the submission category (for example, original research).
- Summarize the main findings/discoveries and why they are novel and important.
- Describe how the findings advance knowledge in the respective disciplinary area.
- Explain how the study fits the scope of the journal and argue why the study will be of interest to the journals' core readership. (Where possible, highlight similar papers published in the journal and how the submission fits with these papers.)
- Explain how the submission's contributions and implications align with the mission of the journal.
- Include two standard procedural statements:
    - "We confirm that this manuscript has not been previously published and is not under consideration by another journal."
    - "All authors have approved the manuscript and agree with its submission to [insert journal name]."

- Review the author guidelines and include other required language related to copyright transfer, authorship, or conflicts of interest.

Figure 11.1. Annotated Sample Journal Submission Cover Letter

Font- Times New Roman size 12
Layout- 1 inch margins, single-spaced with spaces between paragraphs

Esther Chinyere Amole, PhD
University of Lagos
Lagos, Nigeria
+234 123 1234
Example@yahoo.com

Your name
Your institution
City, Country
Phone number
Email address

First Step: Check cover letter guidelines on journal's website. Guidelines vary greatly for different journals.

Before submitting, double-check that information is accurate and spelled correctly

Dr. David Bristol, Editor's name- can be found on staff page of journal's website
Editor-in-Chief, American Journal of Tropical Medicine and Hygiene

1 July, 2016

Dear Dr. David Bristol,

Title of your article

Describe need for and relevance of this research

Please accept our research article submission, "Child morbidity and mortality and small-scale livestock production in sub-Saharan Africa." Our study assessed the impact of livestock on child health on a large scale and highlights how such livestock are both protective and a risk factor for child health. Because livestock ownership is highly prevalent in rural sub-Saharan Africa, the findings have implications for a very large population.

Briefly describe study's main findings

Describe research gap this manuscript seeks to fill

Our study outcomes included low height for age (stunting), two-week diarrhea prevalence, and all-cause mortality. We analyzed data from 30 countries across Sub-Saharan Africa from the Demographic and Health Survey. Furthermore, we conducted country-specific analyses and illustrated significant heterogeneity by country. No study to date has used such an extensive amount of data across such a large geographic region. This study brings attention to the contrasting evidence of both the harms and benefits of livestock ownership on child health and fits with AJTMH's focus on international population health and infectious disease. Public health officials, epidemiologists, infectious disease researchers as well as those working in environmental health will find our study of interest due to the increasing concerns about zoonotic infectious diseases associated with livestock production.

Explain why paper is a good fit for journal

Describe study's importance and significance to journal's core readership

Journal-specific disclosure statement: check author guidelines on journal's website for required statements. These vary greatly by journal.

My co-authors are: Dr. Joy Chimebere Bolarinwa and Dr. Oyelami Luman Yusuf. This original manuscript has not been published elsewhere and there is no conflict of interest. We have all participated in and concur with the submission. The authors assign copyright of the manuscript to the American Journal of Tropical Medicine and Hygiene if accepted.

We look forward to your decision, Closing

Sincerely,

Esther Chineyere Amole, PhD
Professor of Epidemiology
University of Lagos

Your name
Your title
Your institution

Many of our research advisees and lab groups include a variety of learners, in terms of their prior experience and writing training,[154] but also a variety of identities and backgrounds. In this section, I will review the importance of and strategies for supporting and retaining groups including those that have been highlighted as especially vulnerable to struggling, dropping out, and slow progress in the published literature, including women,[8,153,371,372] sexual orientation minorities,[152] first generation/low income,[373] second language speakers,[6,23,24] neurodiverse trainees,[25] cultural identities and racial minorities,[31,151,194,374] and those with imposter phenomenon[26,27] and other mental health challenges such as anxiety, depression, and even perfectionism.[18,25,29,375]

While there are some specific strategies that can help to accommodate certain vulnerable groups, there are also overall approaches that will help make your mentorship approach inclusive, flexible, and accommodating. In the upcoming sections, I will review various methods that will potentially support all students, drawing from research across a range of student and trainee populations.

Get to Know Your Trainees

It's important to get to know your trainees so you can identify supports that they may need. While formal approaches like the IDP are a good step toward this goal, getting a deeper sense of a trainee's lived experience and multiple identities will provide further insights that help guide your mentorship.[166,194,373] For example, Peña et al recommended simply asking trainees how they want to be supported, and listening attentively after asking how you can help a trainee reach their education and career goals, and what they need to feel confident in their abilities to excel in their program.[373] Likewise, Kathryn Nielson, in her book chapter on class, race, and dynamics of privilege, recommended

individual conferences to learn more about what writing issues trainees are struggling with.[194]

Foster a Sense of Belonging

Strayhorn's book on a sense of belonging in college defined this concept within this setting as "students' perceived social support on campus, a feeling or sensation of connectedness, the experience of mattering or feeling cared about, accepted, respected, valued by, and important to the group (e.g., campus community) or others on campus (e.g., faculty, peers)."[376] He stressed that a sense of belonging is a basic human need and that it takes on a heightened importance in college because students are newcomers to this social context. He also emphasized that students with certain social identities are more vulnerable to feeling like they don't belong, such as affiliations with some race/ethnicity, gender, class, sexual orientation, or religious affiliations.

At the same time, Strayhorn and others point to data supporting that students with a strong sense of belonging are better off in terms of their mental health, academic performance, motivation, and retention.[373,376–378] You can create an environment where your trainees feel like they belong with some effort and planning, and I review four here: creating a welcoming environment where trainees feel valued, encouraging them to connect with diverse groups and programs, helping them to create a professional identity, and embracing cultural differences.

Creating a welcoming environment can create a powerful sense of belonging. Even the simple act of learning to correctly spell and pronounce your trainees' names can create a sense of belonging.[376] Other gestures, such as going out of your way to do a

favor for a trainee, can make them feel like they are part of something and that they would be missed if they left.[355,376]

Another research finding shows that connecting trainees to diverse student groups and programs (for example, on campus programs) can bolster a sense that they belong. This type of activity can include participation in campus clubs or organizations, peer mentoring programs, collaborative projects, as well as frequent interactions with diverse peers.[152,373,376]

Another pivotal strategy for fostering a sense of belonging is a theme through this book: helping your trainees develop a professional identity.[152,379,380] In practice, this can mean contributing to projects and publications, being recognized by others as members of the field (for example, at a conference or meeting), and engaging in other disciplinary work.[152,373,381]

Research suggests that embracing differences in cultural norms can ease any cultural mismatches that trainees may feel after entering your research lab or group. For example, welcoming different traditions into your team or finding ways to allow trainees to bring their families and communities into the work they are doing, signals that you are open to a range of working styles and values.[373] Martin East suggested mentors examine their own comfort zones, as well as those of their trainees, while paying particular attention to their own, often invisible, cultural assumptions and recognizing how difficult cultural transitions may be for trainees.[163]

Provide Emotional Support

In a study on an anti-racism mentorship program in medicine, Rinderknecht et al identified two key themes as important supports for racial and ethnic minority students.

These included tailored mentorship and emotional support from mentors,[374] and these have also been identified as important for other vulnerable groups, such as women and LGBTQ students.[152] Tailored mentorship will be possible after getting to know your trainees' goals, experience and backgrounds, challenges, and personalities through the use of tools such as the IDP, but also through individual interactions with your trainees.

Faculty can provide a positive emotional climate for all trainees. Doing this can entail a range of actions from small to more elaborate. For example, letting your mentee know that you know writing and publishing a paper is a slow process that requires a lot of hard work will help them manage expectations of themselves and feel more supported.[355,382] Further, showing patience and making clear that it is safe for them to show you and your lab or research group rough drafts and emphasizing process over perfection go a long way to create a supportive environment.[24,94,329] Additionally, making sure that everyone has a turn showing their work and everyone also provides supportive feedback helps to create balance.[163]

Finally, celebrate your mentees' milestones. Taking time to recognize trainees who were accepted for a conference and even smaller victories, like perfecting a particularly challenging figure, is a great way to keep the group energized and motivated.[166,382]

Openly Discuss Imposter Phenomenon, Anxiety, and Perfectionism

Impostor phenomenon (also known as impostor syndrome, fraud syndrome, perceived fraudulence, or impostor experience) describes the experience of high-achieving individuals who, despite their objective successes, fail to internalize their accomplishments and have persistent self-doubt and fear of being exposed as a fraud or

impostor.[383] This phenomenon, along with self-reported mental health conditions, such as depression and anxiety, are prominent health concerns among doctoral students[384,385] and post-doctoral research fellows.[27] These conditions are often the cause and/or result of writing-related challenges; for example, imposter phenomenon reportedly leads to writing anxiety, but also anxiety can lead to procrastination or other barriers to progress, triggering further stress.[27,384–386] Additionally, those reporting impostor phenomenon have a tendency to rule out career opportunities and faculty positions because they are too intimidated to apply for them.[27] Other mental health conditions have a similar negative correlation with forward movement and career progress.[386]

A supportive mentor can make an enormous difference for those experiencing such conditions and associated self-doubt and barriers to progress.[387] Mentors can help normalize such challenges, by sharing how widespread they are and providing emotional support.[27,388] Asking trainees to offer support to others who also struggle with such conditions can also be an effective coping strategy.[388] Providing extra aid in problem areas, such as extra practice or support with writing, can also be helpful.[27] Other coping strategies have already been described above (completing IDPs to help a trainee have structure for progressing in their program, and fostering a sense of belonging and professional identity).

Other, more writing-focused strategies include challenging perfectionism and providing affirming writing feedback.[25] Providing environmental and social supports for productivity can also help trainees overcome barriers to progress; these can include the creation of interim deadlines, accountability checks, and other structural supports.[25,166,389]

These do not all have to come from you. Connecting your trainees with peer-writing groups or other communities of practice will be of great value in this regard.

Being Flexible

While structure is important and helpful to trainees, it's also important to be flexible; for example, using the principles of universal design and allowing trainees to complete work in a way that works best for them (see more on this in Chapter 4). It's also helpful to have a flexible orientation in adjusting policies and deadlines, or to offer a range of meeting times to help keep the writing process moving forward and show that you support and value your trainees.[373]

Addressing Common Challenges of Being a Mentor

This chapter has focused on supporting your trainees, and this endeavor can be incredibly time consuming and create its own stressors for mentors.[6,18,390] Particularly for women and some of the underrepresented groups mentioned in this chapter, mentoring can present challenges alongside a mentor's own struggles for career advancement and publication.[153,166,371]

Several strategies can help to lighten your load in mentoring your trainees. Positioning your trainee with partner or group support for peer review, writing groups, and other communities of practice are also flagship strategies for supporting mentees and also save you time and effort.[25,52,53,232] Encourage your trainees to identify multiple mentors[363,373,391] to provide additional support, guidance, and even writing feedback. Where possible, structure your mentorship into group (rather than individual) meetings to streamline your process and help mentees learn from one another. Joining forces with other mentors is another option to streamline regular meetings and keep the progress

moving forward.[231,390] Finally, collaborating with your trainees on publications provides a return on all your guiding efforts.[6,74]

Related Open-Access Resources

- Resources for assessing the skills, interests, and goals of new mentees and monitoring them over time:
    - MyIDP Science Careers Individual Development Plan from AAAS
    - Individual Development Plan Consulting and Workshops from the NIH
    - Individual Development Plan Resources from the NIH National Institute of General Medical Sciences
    - How to Create an Individual Development Plan from the NIH National Institute of Environmental Health Sciences
- Some scientific writing programs have made their materials publicly available on the web. One such website is the Scientific Communication Advances Research Excellence (SCOARE), which provides excellent teaching and mentoring materials for scientific writing.
- Janke KK. Bzowyckyj, AS, Traynor AP. Editors' Perspectives on Enhancing Manuscript Quality and Editorial Decisions Through Peer Review and Reviewer Development by American Journal of Pharmaceutical Education 2017; 81(4): Article 73. https://doi.org/10.5688/ajpe81473
- The University of Manchester Academic Phrasebank (provides example phrasing for language used in academic papers)

Instruction Planning Ideas

- Consider whether one of your advisees might be interested in collaborating on a journal peer review. How would you organize the work? Would you each write a complete review in parallel and then compare notes? Or would you assign your advisee one or more sections of the paper and then provide feedback on their review of this section?
- If you are currently collaborating with students on a journal article, consider including your trainee in parts of the development process that you typically do not include students in. For example, ask your trainee to draft the cover letter, make an initial assessment about a good target journal, or participate in other typically "hidden" parts of the publishing process.

Chapter 12: Helping Struggling Writers Overcome Challenges Through Writing Productivity Strategies, Retreats, and Writing Support Groups

Without publications, our research findings remain unrealized.[2] In this book, which is focused on scientific journal articles, writing productivity refers to any activity that helps your trainee move toward publishing their paper.[392] This includes activities such as putting words on a page, but also reading articles, searching for an appropriate target journal, creating a figure, responding to peer reviewers, and emailing a coauthor.[392]

Common Writing Barriers and Facilitators

Writing barriers vary widely across geographic context, institution type, the researcher's stage of training and discipline, and even demographic factors like gender (see Table 12.1). The most commonly cited barrier is lack of time,[29,393–397] but other common barriers are lack of writing skills,[29,375,394] lack of mentorship,[29,394] writing in a second language,[29,394] and anxiety and perfectionism[29,375] (see Table 12.1 for a more complete list). In low-income settings (though not exclusively), other barriers such as lack of access to articles behind a paywall,[251,396] lack of budget for software (for data analysis or citation managers), and lack of budget for open-access fees[251,396] play a role. At the same time, many of these barriers can be overcome.

Key supports and facilitators that have been covered already in this book include providing mentorship and writing feedback (see Chapter 9),[375,395–397] providing structured productivity guidance (including tasks and deadlines) (see Chapter 11),[375,397] asking trainees to *provide* peer feedback to others (see Chapter 3),[375] and creating a supportive climate (see Chapter 11). The next part of this chapter will cover strategies that can be used with your individual trainees, adding more approaches that line up with covered

strategies (for example, additional structured productivity guidance approaches) as well as new strategies that have not been thoroughly covered thus far. Several approaches are aimed at helping trainees who are struggling to make progress and additional approaches are described to support overall productivity in all trainees. The final part of the chapter focuses on strategies for group support such as setting up a writing group or writing retreat.

Table 12.1. Summary of Well-Documented Barriers to and Supports for Writing Productivity	
Individual barriers	**Supports/facilitators**
• Lack of time[28,29,393–397] • Lack of knowledge and skills for writing a scientific paper[28,29,375,394] • Lack of mentorship[29,394] • Lack of formal structure to support and sustain writing for graduate students[29] • Writing anxiety and perfectionism[28,29,375] • Writing confidence[28,375,393] • Trouble getting started[395]	• Mentorship and receiving feedback[375,395–397] • Having structured tasks and deadlines[375,397] • *Providing* peer feedback[375] • Supportive organizational culture[396,397] • Checklists and guidelines, such as CONSORT and STROBE (freely available through the EQUATOR Network), that describe where and how study elements should be reported in the manuscript; these tools can also be useful when the research project is in the planning stage[398] • Embracing messy first drafts[29,102]

	• Freewriting to overcome anxiety and perfectionism[399]

Strategies for Individual Trainees Who Are Struggling to Make Progress

Ensure Your Trainees Are Prepared With Appropriate Review of the Literature

The source of anxiety about putting words on the page may actually be a lack of preparation to start writing; i.e. a trainee has not sufficiently read and/or processed the literature.[102,103] If your trainee is experiencing anxiety or struggling to start writing, inquire about what reading they have done and how they have engaged with their reading. For example, has the trainee annotated their readings? More on this topic can be found in Chapter 2. Lack of planning can also be a barrier to starting (see Chapter 5).

Emphasize That Messy First Drafts Are an Important Part of Writing

As noted above, writers can feel anxiety about initiating a project. If a trainee has thoroughly read and considered relevant literature, the problem could be a fear of a blank page or a desire to see something very polished on the page early on.[400] Encouraging your trainees to make space for the early, messy stages of writing can help to free them of perfectionism and help them move forward.[401] For example, you can explain that the first draft is meant to be a "discovery draft" in which they figure out what they have to say and how to say it,[102] and that they can later refine their ideas, clarify their arguments, and smooth out the language in a subsequent draft.[402]

Brainstorming to Support Progress at Any Stage of Writing

Brainstorming is an unstructured way of opening up and exploring a topic and can help writers generate ideas that help them with any stage of the writing process.[214] One such brainstorming technique is freewriting,[213–216,401,403,404] which can help a writer plan

their paper or work through writing barriers.[213] To do a freewriting activity, a writer puts pen to paper or fingers to keyboard for a specific time (e.g., 10 minutes) and focuses on thinking rather than crafting their text. The key to freewriting is staying in "the zone" and continuing to write even if the writer is not sure what to say.

An example freewriting prompt to help students plan their paper is shown in Box 12.1, and an additional freewriting prompt intended to help writers work through a writing roadblock is provided in Box 12.2.

Box 12.1. Activity Idea: To Help Your Trainees Reflect and Plan, Ask Them to Do a Freewrite Using the Below Prompt

Think about your plan for moving your paper forward. This can include a schedule for completing the work, conducting online searches for primary sources, visiting the writing center, or other strategies or plans that will help you move forward. During this in-class activity, I would like you to write for 10 minutes without stopping to create space for reflecting on your plan for making progress on your writing project.

The key to successful freewriting is to let your thoughts flow and to immediately put them on paper rather than filtering them or thinking about what you write before you write it. Write whatever comes into your mind and do not worry about grammar, spelling, or sentence structure and do not judge your writing. For some, 10 minutes may feel like a lot of time—for others, it may fly by.

If you can't think of what to say, express that on the page. For example, you can write "I can't think of what to write here, I am trying to think about the strategies that have helped me in the past and those that might help me for this project. Don't really know what to say next."

When time is up, read over what you have written. Some of it may not be coherent or helpful; however, your freewrite likely contains some insights to consider in planning your project and moving it forward.

Box 12.2. Activity Idea: Support Your Trainees in Overcoming a Writing Roadblock With a Freewriting Activity Using the Prompt Below

You are about a third of the way through your writing projects, and many of you are wrestling with one or more challenges in moving their paper forward. Freewriting is a way to help you reflect on these challenges.

Think about a particular roadblock you are experiencing in moving forward on your paper. Roadblocks can be anything from struggling with procrastination to not finding helpful articles to struggling with your paper's organization. During this in-class activity, I would like you to write for 10 minutes without stopping to create space for reflecting on your roadblock.

The key to successful freewriting is to let your thoughts flow and to immediately put them on paper rather than filtering them or thinking about what you write before you write it. Write whatever comes into your mind and do not worry about grammar, spelling, or sentence structure and do not judge your writing. For some, 10 minutes will feel like a lot of time—for others, it may fly by.

If you can't think of what to say, then express that on the page. For example, you can write "I can't think of what to write here, I am trying to think about how I can stop procrastinating but I don't know why I put things off. I am just stuck and don't know why I get caught in this trap again and again. Don't really know what to say next."

When time is up, read over what you have written. Some of it may not be coherent or helpful. However, some insights about why you are experiencing roadblocks may arise or you may even come up with ideas to pursue about how to address your writing roadblocks.

Provide Checklists to Help a Writer Get Started

Checklists are essentially a self-assessment approach to writing. They are a standard feature of the scientific publication landscape[405] and have been successfully used to teach students to write in a certain kind of format.[406,407] Consider providing the relevant checklist to your trainees as they begin writing to provide a means to get started and assess their draft for completeness.

"Mind to Paper Dictation" to Help a Trainee Compose Their Draft With Voice Dictation

Some trainees experience severe barriers to getting a first draft down on paper. One approach to consider discussing with such a trainee is called "Mind to Paper Dictation." In this approach, a trainee who is stuck in the initial drafting stage voice dictates a messy first draft to help them move ahead to the revision stage. The key to this procedure is meticulous preparation; for example, thoroughly reading and annotating the literature. More information is provided in Box 12.3, and additional resources on this approach are provided at the end of the chapter.

Box 12.3. Activity Idea: Help Writers Overcome Barriers to Writing a First Draft With "Mind to Paper" Dictation"[102,223,408,409]

Have you ever had the experience of asking a writer to clarify a section of their text and realizing that it is much easier for them to share their idea verbally than on the

page? The "mind to paper" or dictation approach to writing a first draft can be helpful to these kinds of writers. There are different ways to implement this approach but all involve speaking words that are captured on the page. More resources on this topic are included in the open-access resources at the end of the chapter.

Strategies for All Trainees for Maximizing Their Writing Productivity

Encourage Your Trainees to Write Most Days in Short Bouts

Often writers wait to feel inspired, or for a big block of time, or until they are up against a deadline to focus on their writing.[392,410] Share with your trainees that waiting until conditions are just right can mean a lot of time goes by between writing sessions. And when they don't write regularly, their material tends to get "cold." Cold projects are harder to reconnect with and easier to put off. Getting into a habit of writing most days—even for short sessions, like 30 minutes—can help writers keep their head in a project.[201,202,205,390,392] In fact, writers can be productive in small blocks of time, even as small as 10-20 minutes.[392,400,411]

To help your trainees be productive in smaller blocks is helping them to reconceptualize their definition of writing.[392] Instead of thinking of writing as putting words on the page, encourage your trainees to think of writing as any activity that goes into their final product.[392] For example, copying odds ratios into a table, working on a figure, or emailing a coauthor can all be considered writing. Additionally, keeping a list of activities that can be done in smaller blocks of time is helpful in making the most of these short blocks of time when they present themselves.[392]

Set Specific Goals and Position for Focus

To overcome time limitations and trouble getting started, encouraging your trainees to set specific goals about what they want to accomplish in each writing session will help them break their bigger goals into manageable blocks and give them a clear sense of focus.[410] Setting goals also requires the writer to engage in a reflective mindset where they take a few steps back from their writing to think about the overall product and process. They can think about their work with fresh eyes. This mindset helps writers improve their approach to writing.[217,392]

Identifying an environment that helps trainees avoid distractions is a powerful way to help them dial into their work.[410,412] Encourage your trainees to turn off their computer and phone notifications and ringers to avoid distractions. A writer can send the signal to others that they don't want to be interrupted by closing their office door (if they have one), putting on headphones, or using body language. They can try turning their back to office mates or house mates to send the signal that they don't want to be disturbed. Encourage your trainees to write in blocks of time no longer than 1 hour. For most of us, writing for longer than this without a break is difficult and may not be sustainable for daily writing.

Group Activities to Support Writing Productivity

Writing Retreats and Writing Groups

Writing retreats and writing support groups each address different writing barriers to help writers move their products toward completion. Each approach has strengths and drawbacks, and they can be tailored to the participants, budget, and other goals and constraints of the group. This section provides a brief summary of each type of writing support activity.

Writing retreats and writing support groups are popular strategies for boosting writing productivity. There is a lot of variability in the formats and type of activities that are included. Whereas some are focused solely on providing protected writing time, others structure in peer feedback. Some retreats and writing groups provide mentorship and writing instruction and some feature goal setting. They can be virtual or in person.[413] The timing can vary, with retreats being held across multiple days or just one day. Writing groups often meet weekly or every other week for an hour or more.

Both writing retreats and writing groups offer many benefits (see Table 12.2). While both formats provide an opportunity to move products forward,[393,414–417] protected time and space,[414,418–420] social support,[414,418,419] the opportunity to learn writing skills and good writing habits,[397,414,419–421] increased confidence,[393,413,414,420,421] guidance and feedback,[1,418] writing groups had the additional advantages of being low cost and providing sustained support.[392,421]

Table 12.2. A Comparison of the Benefits of Two Similar Approaches to Writing Productivity: Writing Retreats and Writing Groups

Writing retreats	Writing groups
• Protected time and space for writing,[414,418–420] structure for writing[420] • Move products forward[393,414–416] • Social support and encouragement[414,418,419]	• Make progress on writing products[422] • Support[1] • Socialization and collegiality,[413,421] encourage development of writing culture[1] • Facilitated collaborations[413] • Increased motivation to write[413] • Informal mentoring[413]

Table 12.2. A Comparison of the Benefits of Two Similar Approaches to Writing Productivity: Writing Retreats and Writing Groups	
Writing retreats	**Writing groups**
• Networking and social interaction/collegiality[393,414,415,418] • Increased motivation to write[414,419] • Mentorship and guidance[418] • Peer or mentor feedback[414,415,419] • Goal setting and accountability[414,420] • Increased writing skills, knowledge, and strategies[397,414,419,420] • Increased confidence and self-efficacy[393,414,420] • Reduced anxiety related to writing[418] • Development of good writing habits and practices[420]	• For doctoral students, provided more regular/accessible support vs. busy supervisors[1] • Feedback on writing[1] • Giving feedback benefitted person providing feedback[1] • Increased writing skills[421] • Increased confidence[413,421] • Accountability to self and/or peers[413] • Benefit from discussion of writing[1] • Development of good writing habits[413] • Low cost[421] • Sustained support[392]

Both retreats and writing groups also have drawbacks (see Table 12.3). Writing retreats tend to be a bit more involved to organize compared to writing groups.[251,393,418,419] Costs are also typically higher for retreats, particularly if food and beverages are provided and if overnight accommodation is required.[251,393,418,419] Sustainability of support after a retreat is another challenge. Follow-up support to help sustain momentum after retreats end can be helpful, but adds complexity and cost.[251,418,420,421,423] Writing groups tend to be more sustained across time.[392] However, a challenge for writing groups can be

attendance; it often starts robustly but can wane over time.[397] For both types of events, scheduling can be difficult.[393] Mentors may be in short supply for both formats, and the mentors who do participate may feel overburdened if they are called on to provide feedback too frequently.[251,397,418] In both cases, organizational support will be needed to facilitate the scheduling, budget, and time away for participants.[418]

Table 12.3. A Comparison of the Challenges of Two Similar Approaches to Writing Productivity: Writing Retreats and Writing Groups

Writing retreats	Writing groups
• Costs of venue, food and beverages, lodging (if multi day), travel (if relevant), and time away from productivity at work[251,393,418,419] • Access to appropriate venue[393,414,418] • Sustainability of support after retreat[418,420,421,423] • Competing workload demands/priorities[393,414,418] • Scheduling[393] • Limited mentors/burden on mentors to provide feedback[251,397,418] • Need for organizational support[418]	• Attendance[397] • Competing workload demands and priorities[393,414,418] • Scheduling[393] • Limited mentors and burden on mentors to provide feedback[251,397,418] • Need for organizational support[418]

Plan a Writing Retreat or Writing Support Group for Researchers to Support Productivity

Here, some sample plans are provided for the two flagship activity types to support group writing productivity. There are many different versions of retreats and writing groups. Some involve only protected writing time, some offer writing feedback, and others may include a discussion of writing barriers and strategies to improve output.

As with other types of events, conducting a needs assessment prior to planning writing retreats and groups will provide a sense of the experience level of the group, participant goals, and what types of activities they would like to be included.[252,418,424] Surveying participants after the event to gather evaluations and suggestions is critical to understanding what went well and what can be improved the next time.[251]

Writing Retreat Planning Tips and Sample Agenda. This section begins with three tips for hosting a successful retreat. First, limit your retreat to a smallish group; for example, a maximum of 10 people.[418] Including more than 10 will make it more challenging to have an inclusive group discussion and may make it harder for participants to focus on their writing.

Second, there are several considerations for choosing the right space for your retreat. Holding retreats in person can help participants avoid distractions.[393,416,418] An ideal setting is one that is far enough away from participants' worksites to make it very inconvenient or impossible to run back to their office during the event.[393,419] Serenity is a key part of creating a peaceful space for writing.[393,416] If possible, hold the retreat in a beautiful setting and, if time permits, build in 30 minutes or so for participants to take a short walk (e.g., after lunch) to enjoy the outdoors and stretch their legs after a long morning of writing.[393]

Third, create a safe and non-judgmental environment to foster honest discussions about participants' writing struggles and to help people relax enough to write free of stress.[414] Discussing some ground rules at the beginning of the retreat can help foster a sense of support and community. Specific things to discuss include attentive listening, being respectful of people's writing and challenges, and being supportive in all other aspects.[414]

Table 12.4 offers a sample writing retreat agenda based on the recommendations in the literature, and a sample writing prompt and discussion prompt are presented in Box 12.4. These are intended to be a starting place for planning and will need to be tailored to your setting. Typically, more senior researchers simply want protected time for writing, while less experienced writers often want an opportunity to receive feedback on their work. Tailor the activities and schedule to your context and participants.

Table 12.4. Writing Retreat Sample Agenda (Should Be Modified to Fit Your Context and Needs)	
10 a.m.	Welcome and introductions (coffee and morning snack)
10:10 a.m.	Reflective writing prompt and discussion of writing strengths, challenges, and strategies for addressing challenges
10:25 a.m.	Set goals for morning writing time
10:30 a.m.	Morning writing time
12:30 p.m.	Catered lunch

12:50 p.m.	OPTIONAL outdoor walk (or keep writing)
1:20 p.m. – 4:30 p.m.	Set goals for afternoon writing time then write until 4:30pm

Box 12.4 provides sample writing prompts for reflection and discussion on the topic of writing productivity. Pairing a discussion topic with a writing prompt can help writers organize their thoughts before discussing a topic.[403] This helps everyone (particularly those who may process more slowly) to participate more fully. For the below writing prompt, you may start by asking participants to share one challenge and then allow other participants to respond with suggested strategies to overcome this challenge. Through listening and responding, the group tends to recognize the challenges they have in common and different strategies that may be helpful. To carefully manage the timing of the discussion, it will be helpful to set a target duration for people to share (e.g., 1 minute) depending on the size of the group and gently prompt them if they go over this limit.

Box 12.4. Activity Idea: Ask Writing Retreat Participants to Reflect on the Below Writing Prompt for Subsequent Discussion

Write about your writing challenges and strategies.

Write for 6 minutes on the following prompt. This writing is just for you and nobody else will see it.

PROMPT: Think about the professional writing you have done over the past school year.

- Describe 2-3 of your biggest challenges. Are they stubborn challenges? Are they transient? Have you had any luck overcoming any of them? If so, what strategies have been successful?

Writing Groups: Tips and Sample Agenda. Similar to the diversity in writing retreats, there are many different ways to organize a writing group. To start with, some tips for organizing a writing group are presented and then a sample structure that can be a starting place when planning your retreat is included. This structure is not the only way to organize a writing group, so tailor your group to the needs of your participants.

Many writing groups meet for an hour each week.[400,417] An hour is enough time to be productive, but it doesn't feel like a daunting time commitment. Further, organizing your writing group as an 8- or 10-week cycle rather than running it continuously may be easier for participants to commit to due to the discreet time block.[392] Additionally, when run in continuous cycles (for example, a series of 10-week blocks), joining a new cycle may feel less intimidating to new members compared to joining a longstanding group.[392] Additionally, the timing of your group's cycle can coincide with your institution's schedule (e.g., your academic semester).

Writing groups may be held in person, but virtual gatherings can be a good option to help people fit the meeting into their busy workday.[413,425] Further, limiting groups to eight people should ensure there is enough time for participants to have a brief discussion and fit in some writing.[392]

Like writing retreats, it is important to create a supportive environment and a sense of community.[1] Having an explicit discussion about this at the beginning of each

writing group cycle will help new members understand the expectations and will reinforce the values for renewing members.

Box 12.5 provides a sample structure for a specific type of writing group called a "WAG" (writing accountability group). This format was described in Kimberly Skarupski's book WAG Your Work.[392] A WAG is a peer-facilitated group that meets once per week over a 10-week period. WAGs help people establish good writing habits and offer a community of support. A WAG is limited to 4-8 members and can include in-person or virtual attendees (or a mix, if you are willing to manage the logistics). WAG members must commit to attending at least 8 of the 10 weekly sessions.

Box 12.5. Writing Group Structure Idea: Sample Writing Accountability Group (WAG) Meeting Structure[392]

- 15 minutes of goal setting and accountability (everyone articulates what their goals are for the day's session and reports on whether they met the goal they set last week)
- 30 minutes of timed communal writing
- 15 minutes of goal setting for the upcoming week

A sample tracking spreadsheet for one week of a WAG is shown in Table 12.5. The spreadsheet is a modified version of the one provided in the *WAG Your Work* book.[392] The tracking sheet is completed by the peer facilitator, who starts by noting attendance and then asks each person to report whether they accomplished the goal they set during the prior meeting. I have made a few adjustments to the WAG format presented in *WAG Your Work* based on feedback from participants I have worked with in the past. One of them is an adjustment to the time frame for participant goals. Whereas

the original format asks participants to set a goal for the next 7 days, I now use a 5-day time frame to help participants view their writing in a way that maintains work-life balance.

The next activity is setting a goal for the 30-minutes of writing that occurs within the group meeting time. This is followed by a timed communal writing segment. Smaller groups will be able to squeeze in more writing. One of the groups I facilitated only had four participants, and we adjusted the time allotted for writing to squeeze in 45 minutes of writing each week! After the communal writing time, participants report on whether they achieved their goal. Finally, each member sets goals for the next five workdays.

Table 12.5. Sample Writing Accountability Group (WAG) Tracking Spreadsheet (Include the day of the week, meeting time, and meeting location here)

	Person 1	**Person 2**	**Person 3**
WAG WEEK #1			
Attendance	present	present	present
5-day goal achieved?	n/a	n/a	n/a
WAG 30-minute communal writing goal	Table 1, draft intro	Read three articles, letter to editor	Copy output to Table 3
Goal achieved?	yes	yes	yes
5-day writing goal	30 mins. daily	Complete draft of discussion section of emphysema manuscript	Read 10 review articles

Related Open-Access Resources

- Andresen K, Laursen J, Jacob R. Outlining and dictating scientific manuscripts is a useful method for health researchers: A focus group interview. *SAGE Open Medicine*. 2018: 6:1–5.[408] https://doi.org//10.1177/2050312118778728
- Spanager L, Danielsen AK, Pommergaard H, Burcharth J, Rosenberg J. A feeling of flow: exploring junior scientists' experiences with dictation of scientific articles. *BMC Medical Education* 2013, 13:106.[409] http://doi.org/10.1186/1472-6920-13-106

Instruction Planning Ideas

- Consider where the sticking points are with your trainees in terms of their writing productivity. For example, do they tend to struggle with time management? Anxiety? Would any of the strategies discussed in this chapter help them? Would the time investment on your part to help them address these challenges be worth the payoff?
- Where do you notice inefficiencies in your mentorship of trainees? Might any of the strategies presented provide an opportunity for you to enhance productivity of your trainees while simultaneously reducing your time burden?

Part 2: A Guide to Planning and Writing a Publishable Journal Article

Part 1 approached writing instruction and mentorship in a variety of ways. The early chapters discussed socializing trainees into academic and disciplinary ways of thinking, behaving, reading, researching, and writing. It also included teaching and mentoring strategies to support trainees with diverse needs and experiences.

Part 2 constitutes a major shift from Part 1 in terms of content and intended readership. While Part 1 guided instructors and mentors to teach and train writers, Part 2 provides guidance on writing a scientific paper. In Part 1, I directly address instructors and mentors as "you," but in Part 2 "you" refers to writers, students, mentees, and trainees. In practice, instructors and mentors may also find Part 2 helpful as a resource for teaching materials and to fill in missing pieces in their own training.

Part 2 begins with Chapter 13, which is intended to help writers understand and respond to their writing context by considering factors like their purpose, intended readers, and format and how these might shape the writing and framing of the paper. This chapter also guides writers on crafting persuasive arguments. Chapter 14 guides writers on building a successful author team and choosing the right target journal. Chapters 15-22 provide a how-to for writing each section of a paper, starting with crafting the introduction and ending with writing a compelling title. Each short chapter offers guidance on the structural elements of academic journal articles with examples, tips, and helpful resources for developing each part of a paper. Finally, Chapter 23 offers advice and examples guiding author teams to effectively respond to peer reviewer comments.

Chapter 13: Crafting Your Writing to Get Attention and Reach Your Readers

This chapter builds on the concepts aimed at writing instructors that were discussed in Chapter 3, which reviewed different ways of defining rhetoric in the context of scientific writing, considering the problem that is addressed with a research study, how a study fits with the existing literature, and thinking through the goals of a paper and its intended readership. The chapter also discussed the importance of writing persuasively, including anticipating how readers will respond to a text. Finally, the concept of genre was described, emphasizing how the design and conventions of an academic journal article bring together writers, their purpose, and their readers.

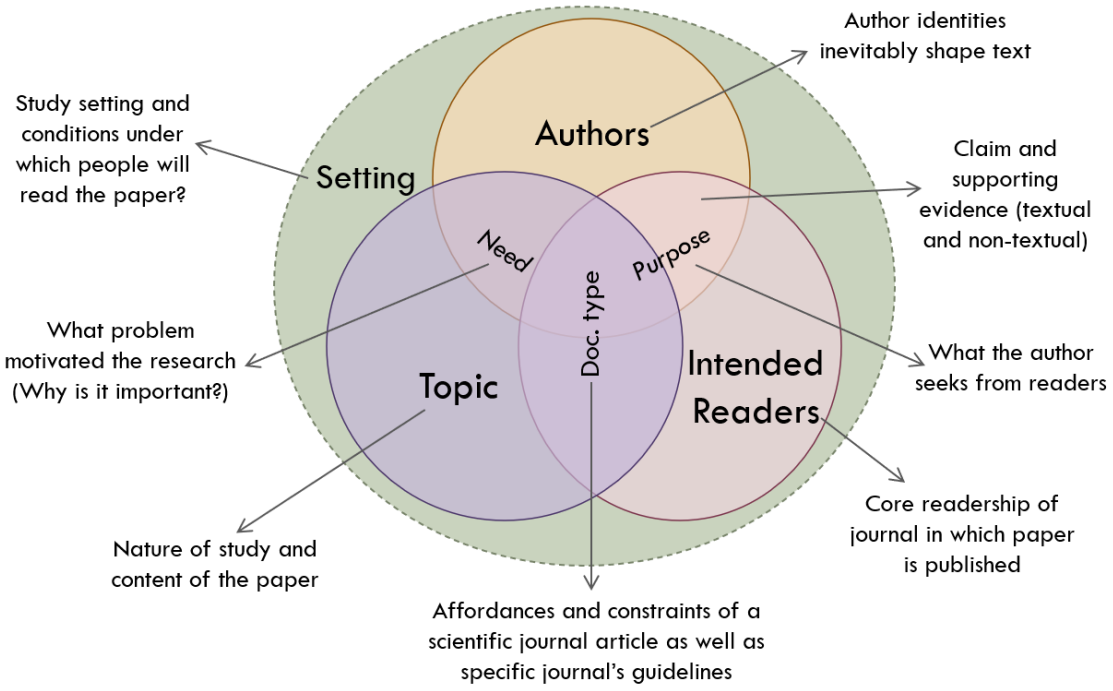
This chapter builds on the above concepts and is intended to help you think through key writing approaches that will help you get attention and reach your readers. To make the concepts more relatable, examples and hypothetical scenarios from health sciences research are used throughout. The first part of the chapter describes how you can reflect on and respond to your writing context and readership to increase your impact. The second part of the chapter reviews the importance of writing persuasively and provides guidance on how to do this. This notion of making arguments is carried through from Part 1 and also sets the stage for later chapters that outline standard arguments made in each section of a scientific manuscript. The final part of this chapter describes effective writing style features to help you showcase your research and draw readers in.

Understanding and Responding to Your Writing Context

Though writing can feel like a solitary activity, every text is situated within distinct contexts.[125,127,128,134] The contextual features focused on here include your topic and intended readers, your author team, the purpose of and need for your paper,

characteristics of the document type (genre), and the setting.[125,127,128,426] (see Figure 13.1). Thinking carefully about these contextual features can help you appropriately tailor your paper and shape your arguments, improving their relevance and impact.[45,78,117,125,127,134,144] To illustrate the concepts presented in this section, the example of a team of Ethiopian researchers writing a paper targeted for the journal *Midwifery* was used. In this example paper, the authors describe their investigation of a midwifery intervention to address maternal mortality in Ethiopia. The bigger bubbles in Figure 13.1 show the three major components of this example context: the topic, intended readers (i.e., the core readership of *Midwifery*), and the authors.

Figure 13.1. Key Contextual Factors for Writing a Scientific Paper. Every text is situated in a certain context, and key contextual factors are shown in the figure. The figure is adapted from Jory.[127]



*Describing Your **Topic** for Your **Intended Readers***

Focusing on two of the three contexts in the larger bubbles, authors must reflect on who their intended readers are and describe their work ("topic") in a way their readers will understand.[125,127,426] While the core readership of *Midwifery* will know a lot about the practice of midwifery, this journal is international; as such, readers will likely need the authors to explain background on the research setting to allow them to fully understand the study and results. In this example, readers might need background about women's attitudes toward giving birth in a healthcare facility, as well as other relevant information such as whether the health care system in Ethiopia covers the cost of childbirth.

*Understanding Each **Author** Team Has a Particular Perspective and Background*

The author team is represented in the third big bubble. While the authors should focus on the reader experience when crafting their text, it's also true that every author team will have their own perspective and knowledge base that inevitably shapes their message.[125,127,426] For example, if the authors are midwives themselves, they may see things differently than if they are PhD researchers or even physicians. Other factors such as career stage may also impact the authors' perspectives. Recognizing this orientation and adjusting the author team to include diverse perspectives where appropriate will help the authors more effectively reach their readers.

*Clarifying Your Author Team's **Purpose***

There are additional elements in areas where the bubbles overlap in Figure 13.1 that can help the author team focus their writing. For example, the authors themselves need to clarify their purpose in writing to their intended readers.[125,127,426] Why did they

choose *Midwifery*? Their purpose will also impact the way they write their paper. What do they hope their readers will do with the information? Presumably in this case, many readers are midwives who can apply the intervention described (assuming it was effective!) in their own practice. It is also possible that the authors' purpose is to set the stage for a clinical trial or to provide evidence to support their ministry of health in changing their policy.

*The **Need** for Your Research Should Come Across*

The need for the research should clearly come across in the paper; it should feel relevant to the intended readers and be communicated in the opening paragraphs.[125,127,426] For example, the high maternal mortality in the region can be described with statistics and relevant contextual information.

*The **Document Type** (genre) Shapes Your Message (and Purpose)*

The document type—in this case, a journal article—also shapes how the text is written because there are constraints and affordances with such documents as well as every other document type.[112,117,426] For example, original research papers are typically limited to about 3,000 words and 5 tables and figures. There may also be a limit to the number of references. The authors will need to craft their message with those limitations in mind. There are other limitations to consider as well: a scientific article has a formal tone and structured style and these constraints will also shape the message. A research team inevitably learns many things throughout the course of their research investigation, and only a slice of this new knowledge is presented in an academic paper. Ultimately, only the most critical and relevant information that fits the journal article structure may be included.

*Reflect on the **Setting(s)** to Help Connect to Your Readers*

The setting can refer to the study setting and the way in which readers will consume the paper.[426] First, the setting describes the context of the research; for example, the political, cultural, and geographic backdrop of the study location, or the type of hospital or community from which data were collected. Events such as pandemics also shape the setting. In our example, a pandemic may impact how likely obstetrics patients are to visit a healthcare facility and how they will be cared for in that context. It's also true that if data were collected and the paper is published during a pandemic, then it will be read (and should be written) within that frame.[427,428]

Another example of setting is the medium in which readers will read the paper. For example, most journal articles are read electronically, so using electronic links to supplementary material or other resources will work well for this medium, and color can be typically leveraged for online figures at no additional cost.

The next section addresses how the writing context should shape the arguments or claims made by the authors and the evidence provided to support their claims. Though some people might think of scientific writing as objectively presenting facts, the data do not "speak for themselves."[137,138] Scientific writing should be comprised of persuasive arguments starting with the document's title and ending with the discussion section (see Chapter 3 for more on persuasive arguments).[34,136,138] The next section provides an overview of the types of arguments commonly used in academic papers, and the subsequent chapters will provide greater detail about these arguments.

Persuasive Arguments Help You Reach and Impact Your Readers

Learning to write persuasively will help you be a more effective writer.[117] For example, in the introduction, writers make the argument that there is a research gap in the topic they are investigating.[117] In the methods section, a key argument is that you have used high-quality methods to carry out your study.[135] In the results section, you should make arguments about patterns in your findings and support them with data and the results of statistical tests.[135] The discussion should include a range of arguments about the importance of your study and how it fits into the broader literature.[135]

Logical arguments are based on logic and reasoning.[139] In our midwifery example, a logical argument could be made in the introduction section of our example paper that a midwifery intervention is needed in Ethiopia because of the high maternal mortality there. To be an effective logical argument, it would need to be supported with statistics specific to that region (e.g., in the form of a citation). Another type of logical argument could be included in the results section of this paper. The authors might claim that their intervention was associated with lower maternal mortality compared to the control group. They might support this claim with data from a figure or table showing relevant data and/or the result of statistical tests. These are logical arguments because they appeal to the reasoning ability of the readers and offer evidence in the form of facts or statistics.

Emotional arguments help you make your case by appealing to a reader's emotions.[139] Typically, emotional arguments are presented at the beginning of an introduction section articulating the problem that the research seeks to address.[135] In our example, the authors might describe the burden and suffering associated with maternal mortality. This description may elicit a response of sadness or even anger about this

suffering. Given that your study addresses the health problem that you have described it is intended to relieve this discomfort.

Ethical arguments[8] build the credibility of your author team to carry out the study.[139] This is a crucial argument that should come across throughout your paper and particularly in the methods section. Through such arguments, you may persuade your readers that your study team is competent and judicious and have used high-quality methods that engender confidence in the results.

Another aspect of making a successful argument is anticipating and addressing counterarguments.[146] One limitation of the scientific article format is that it is largely unidirectional, unlike in-person presentations such as an oral or poster presentation. It is helpful to show your readers that you understand potential objections to your arguments and provide counterarguments to address doubts that may arise for readers.[146] Ultimately, this approach will strengthen your own arguments.[146] One key place to present counterarguments is in the discussion section. This is where you acknowledge your study's limitations and defend them where appropriate. This approach is elaborated on in Chapter 20.

Finally, headings can help you make your arguments clear throughout your paper. Such headings summarize key arguments you have made in a particular section; this reinforces your main points. To create such arguments, you need to identify and distill the main point of each section. This approach can also be particularly effective in the results section of your paper. A subheading entitled "People With Asthma Were More Likely to

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[8] "Ethical" in this context differs from our contemporary understanding of the term. In Aristotle's context, ethical referred to a writer's "ethos" or trustworthiness and their appeal to moral principles.

be Hospitalized for COVID-19" is more effective than the heading "Logistic Regression Results," as logistic regression is the method used to identify a relationship between two variables rather than an argument about the data. Additionally, strong topic sentences that convey the main idea of the paragraph further reinforce your point and help the reader navigate the text.[430] While crafting your arguments, be sure to follow the style guidelines of your target journal.[431]

Using Writing Style Features to Boost Your Impact and Reach

Style is a broad term, and some writing style features, like a formal tone, characterize a particular document type.[432] But writing style encompasses a range of features, some of which will encourage others to read and cite your work. In this section, four features that have been shown to improve uptake of scientific papers are reviewed[45,78,433]: the first three features (concrete, non-technical, and active writing) help readers understand your work, and the last feature—using a story format to describe your study—invites others to read and cite your work.

Scientific papers can be hard to understand, even for those who are reading a paper within their own subdiscipline.[45,428,434] Writing features such as abstract, technical, and passive writing make a text difficult to read. Papers with these features are cited less often than articles with concrete, nontechnical, and active writing.[45] Why do scientists write this way? A phenomenon known as "the curse of knowledge" causes scholars to be unaware that their writing is unclear, as they are too familiar with the research.[45,435] Jargon and technical language are a major culprit in this scenario because scholars often use jargon as a shortcut to describe a concept or methodological approach. While other experts will understand this shortcut, those without the same expertise—including those

in the same discipline, but outside that subspecialty—and those in other disciplines, such as policy makers and journalists, will not.[45,436]

In this section, I will describe and give examples of the four features that can make your scientific articles easier to read and likely more citable. Using these approaches can also help you reach a broader group of readers beyond your primary target readers (e.g., the core readership of your target journal).[436] While you should tailor your arguments and content to your primary readers, using the writing style features highlighted here will make your work more understandable to a secondary readership of journalists and policy makers.[436] These secondary readers are key to publicizing your work and implementing your findings into local and national policy.

Avoid Technical Language, Abbreviations, and Acronyms

Technical language is a shortcut for a concept or technique and helps us avoid bulky language, but it also makes writing harder to understand.[45,432] In this book, technical language refers to words and phrases that are used by a particular discipline or group, but not by everyone else. For example, an epidemiologist referring to "differential outcome misclassification" in a paper that classifies pulmonary symptoms in COVID patients, is taking a shortcut to avoid writing: "A researcher has mistakenly attributed a health outcome to research participants differently in those with versus without the exposure of interest." While an epidemiologist will understand this shortcut (and may even appreciate its efficiency), those outside epidemiology (e.g., pulmonologists) will probably not understand the jargon. To be clear, researchers need technical language, but writers will broaden their reach by using it selectively and always defining terms on first use.[432,437]

Due to the curse of knowledge, researchers tend to overestimate the amount of technical language their readers will understand.[435] Even when readers do understand it, they need to work harder to process it, leaving less room in their brains for comprehending, remembering, and thinking about the authors' main idea.[45,437]

A few key strategies can help you integrate technical concepts into your writing in a way that prioritizes your primary readers but also takes into account secondary readers as well. First, avoid technical language that is not essential to your work.[435,438] For example, you may find that it's not essential to use a term like "comorbidities" and could instead say "other health conditions." Additionally, avoid jargon in your title and abstract where there is no room to explain or define technical terms.[45,435]

Creating a non-technical descriptive nickname for a technical concept is a good compromise, although it is still a shortcut. A nickname allows you to avoid having to repeat a bulky phrase and it is more intuitive to your readers.[439] For example, if you were writing a paper on tuberculosis transmission and referred to it as being "highly overdispersed," many readers may be confused. "Overdispersion" is not familiar to many without a statistical background, but it's the idea that a small proportion of people are responsible for a very large proportion of transmission. The nickname "superspreaders" is intuitive and can get the point across in a more reader-friendly way.[439] So a title like "Tuberculosis Superspreaders Fuel Minnesota Outbreak" may be preferable to "Overdispersion of Tuberculosis in a Minnesota Outbreak."

Like jargon, readers need to work harder to process text with abbreviations and acronyms.[427,428] Experts recommend limiting the use of these shortcuts to make text more

reader friendly.[427,428] An additional recommendation by writing experts it to avoid "noun chunks," which are described in Box 13.1.

Box 13.1 Tip: Avoid Noun Chunks Because They Make the Text Harder to Read and Process

Noun chunks (also sometimes referred to as noun strings, noun clusters, or noun trains) are strings of consecutive nouns. These chunks of text connect ideas or items in unclear ways.[427,428,430,432] An example of a noun chunk is: We used a *validated poliovirus wastewater surveillance system.* The last noun in the chunk is *system*, but the reader may lose track of what the system does due to the large number of consecutive nouns. To clarify this language, break up the noun chunk into smaller pieces and emphasize the noun that is most important: We used a *wastewater surveillance system* to track *poliovirus.* This *system* was previously *validated…*

Use Examples and Analogies

In addition to jargon, abstract concepts or phrases are hard for readers to understand. Using examples and analogies can help a reader better understand them,[45] as they describe a concept in another, often more familiar, way. For example, the below quote explains nuance in the association between in-person school attendance and getting COVID, an association that was mitigated by multiple prevention measures (such as air filters). The first part of the text is fairly abstract and nonspecific, but the example clarifies it. "This association may not be causal, because in-person schooling and prevention measures are not distributed randomly in the population. For example, households with a child attending in-person school are more likely to be located in wealthier areas with schools that use multiple prevention measures."

Use Present Tense and Active Writing

Writing experts advise that writing in the present tense is more compelling, feels more active, and is also easier to understand.[438,440] In fact, the United States government recommends using present tense in their plain language guidelines.[441]

Active writing is also easier to understand, as passive writing does not always make clear who is performing an action or, in some cases, what has been done, whereas active writing (also called "active voice") identifies the actors and the actions they perform. For example, the passive voice sentence "The treatment protocol was administered" does not identify who administered the treatment protocol nor to whom the treatment protocol was administered. The active version of this sentence identifies who performed the action and is easier to understand: "A nurse from the clinic administered the treatment protocol to each research participant." Active voice is a more lively and engaging way to connect with your readers.[432] It also helps you to create a story, as described in the next section.

Tell a Story With Your Research

At some point, you may have been given the advice "tell a story with your research."[435,442] Stories help readers comprehend and remember information better than non-story formats.[78,84] It may not, however, be obvious how to write in such a format.

Some research has suggested that certain language features create a story-like feel. Table 13.1 describes an explanation and examples of these proposed story-like features. They include referring to the authors through pronouns like "we,"[78,427,428] describing the setting,[78,427,428] making an appeal to readers about why you did the research, using sensory language to appeal to your readers' senses, using conjunctions to

support a logical flow,[78,427,428] and using connective words or phrases to create links and coherence within the text.[78,427]

Table 13.1. Proposed Features of a Research Article Portrayed in a Story Format[78]
Refer to yourself as the storyteller[78,427] Referring to yourself in a text through use of a pronoun such as I, we, or our, makes the text feel like a story with you as the storyteller. Example: "**We** also asked participants to report if they had experienced any COVID-19 symptoms."
Describe the setting[78,427] The setting provides a description of where and when your research occurred and helps a reader picture how and where it happened. To describe the setting, characterize a specific time and / or place. Even a brief phrase (such as the below) helps set the story's stage. Example: "The study was conducted **in the wetlands of Florida over the past 12 months**"
Appeal to your readers about why you did the research[78] Explaining to your readers why you are telling the story or recommending a specific action appeals to your readers because it provides a concrete purpose and/or application. Example: "Gaining a better understanding of long COVID **will help** physicians better treat their patients."
Use sensory (or emotional) language to paint a picture of the story[78,435]

Sensory language paints a picture of a story's background and action. This type of language describes sights, sounds, smells, tastes, touch, or feelings associated with any aspect of a study. Example: "COVID is a **devastating** illness and its impact can **last for months and even years**."
Include conjunctions to provide signposts to guide readers and provide flow[78,427,428] Conjunctions connect words and phrases, providing signposts that guide readers through the story and provide a logical flow, helping them understand and keep track of the story. Specifically, words or phrases that link like to like (e.g., and, additionally, moreover), signify cause and effect (e.g., consequently), contrast (e.g., but, however, on the other hand), or temporal ordering (e.g., first, second, third) are considered part of this category. Example: "As expected, we found that those without underlying health conditions recovered more quickly. **Surprisingly, however**, there was a subgroup of participants without underlying conditions who experienced symptoms for over 6 months."
Include connective words and phrases to create links within the text[78,427] Connective words and phrases create links from one sentence to the next by referring back to the previous text or by repeating text from the previous sentence. For example, (e.g. 'side effects...these side effects are...'; 'result...this result shows that...'). Example: "**Employers** with policies allowing their employees to work from home reported greater productivity. **Such employers** also reported that their employees were happier with their jobs."

This chapter described how you can reflect on and respond to your writing context and readership to increase your impact. A critical approach to reaching your readers is creating persuasive arguments and using writing style features to help you showcase your research and draw readers in. Many of the points made in this chapter point to the ideal article as being simple and streamlined.[428,435,438] Future chapters that address each section of an academic journal article will continue to build on and provide more detail about these concepts.

Chapter 14: Building a Successful Author Team and Choosing the Right Target Journal

In the latter part of Chapter 10, strategies for professional collaborative writing were reviewed, including tips for building a successful and productive author team, advice for designating clear author roles, and guidance for moving a paper to publication. That chapter also addressed the power and challenges of diverse collaborative author teams, highlighting thorny issues such as power imbalances in international collaborations. While Chapter 10 is aimed at mentors, you may find it helpful to use as a supplement to the content in this chapter, the bulk of which focuses on choosing an appropriate target journal. Both chapters briefly review standard authorship criteria and author roles and conventions; this information bears repeating in Part 2 as it is as critical for authors as it is for mentors.

Building a Successful Author Team

Building a successful author team is key to crafting a compelling paper that showcases the importance and rigor of your study. Your author team should have the expertise needed to cover various content areas and methodological expertise and should be functional enough to bring the paper to publication. Each member of your team should meet the below standard authorship criteria, provided by International Committee of Medical Journal Editors (ICMJE)[342]:

- "Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
- Drafting the work or revising it critically for important intellectual content; AND

- Final approval of the version to be published; AND
- Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved."

Virtually all health sciences journals adhere to these guidelines and most ask for confirmation that authors meet these criteria. Many ask for a description of each author's contribution.[443] In addition to being accountable for all aspects of the work, each author should be able to identify which coauthors are responsible for specific parts of the work. Authors should also have confidence in their coauthors' contributions. Of note, artificial intelligence technologies such as ChatGPT cannot be held accountable for their contributions and AI technologies should therefore not be included in author lists.[309]

Authors' position in the author list are tied to their roles.[444,445] Often, in the health sciences, the first author in the list is responsible for developing the initial draft and the last author is typically the senior researcher who may have secured funding for the project, come up with the idea for the paper, or both.[444–446] Aside from the first and last author positions, the third most important author position is the second author, who may have made particularly substantial contributions in terms of the data collection, analysis, or interpretation of the data.[445,447] Ordering of the other author positions typically does not have any specific significance.[445]

One additional author designation is that of the corresponding author. This person usually submits the paper and takes the lead on corresponding with the journal as well as interested readers who may want to make contact after the paper is published.[444,447] This author should understand and be able to explain all aspects of the paper.[444,447] This role is

also associated with a leadership position and is often last author, although sometimes it is the first author.[444,447] Keep in mind that these author roles are conventions and they may differ across different health sciences, disciplines, or cultures.[446,447]

It's a good idea to discuss and agree on author roles early on, including the work each author will perform as well as the timeline for the work.[444] Documenting these decisions on the title page of the draft manuscript where all authors can see the information will provide transparency for the author team.[343] That said, adjustments might be necessary if things don't go as planned.[444] For example, an author may need to move author positions or be removed if they are not able to complete their share of the work, or a new author may be added to address requested changes during a revision. Author teams sometimes struggle with challenges and disputes[347,348] such as confusion about who will be an author on the final paper and members not landing in the authorship position they anticipated. Communication is key to preventing such misunderstandings.

Finally, keep in mind that if you are working within a large, longstanding research group, you should investigate whether they have specific criteria and policies for who can be considered an author and how the writing gets done. For example, an ongoing longitudinal study may have a publications committee through which approval is granted to form a writing team and analyze certain data. Be sure to check with the senior author on your team to find out if any policies or procedures apply to your study. See additional guidance on building a successful author team and organizing the writing and paper development process in Chapter 10 and refer to resources at the end of this chapter for further reading.

Selecting a Target Journal

Early in the writing process, you should decide on a target journal.[431] This will help you to tailor your paper to your intended readership and to a journal's formatting guidelines.[431] Below, I offer a preliminary strategy for identifying a short list of target journals as well as guiding questions that may be used to narrow down your choice. It's important to know up front that you should not submit your paper to more than one journal at a time. This is an unacceptable practice in health sciences publishing, as most journals explicitly state on their website.[448] Simultaneous submission can result in a ban from the journal and more serious professional consequences. Another important point is to be sure that you get input from your mentor when selecting a target journal.

Identifying a Short List of Journals

In this section, I review some big-picture questions to consider with your author team to start thinking through your target journal selection. If you are leading the paper and are planning to suggest some potential journals to your team, consider your professional goals in writing this paper and how they might relate to your journal choice.[133] For example, is the publication one you would like to showcase in applying for a job? Would you like to test new ideas that you can use to build a research program? Or would you simply like to publish the results of a study that was not groundbreaking but can help to build your CV?

Reflecting on these questions can help you think though how much value you place on publishing in a "high impact" journal (a journal with a high impact factor[9]).[133]

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[9] Impact factor, which reflects how often articles in a given journal were cited, is another consideration.[449] Impact factor is not a perfect metric, but it's still an important consideration when choosing a journal.[449,450] You can usually find a journal's impact factor on their website, however, keep in mind that not all journals present an impact factor on their website. This may be because a journal is too new (typically impact factors draw from a period of 2-5 years of citations), or it may not display its impact

Whereas aiming high to showcase a paper may pay off with a publication in a prestigious journal, the tradeoff is the time it will take to tailor and format your paper and such journals are more competitive with a higher chance of rejection. Alternatively, if the goal is simply to see your paper in print, it may make sense to aim for a less competitive outlet that can still connect your author team with your intended readership. This approach could save time because the chances of getting accepted may be higher at a lower impact journal. In addition to the time it takes to tailor and format your paper, you should consider the amount of time it will take to wait for your paper to get reviewed. Some journals provide the average time to the first editorial decision (i.e., whether a paper is sent on to peer review), the average time to the journal's final decision about whether the paper will be published, average time to publication, as well as information on the proportion of papers accepted for publication ("acceptance rate"). If such information is available (it would appear on their website), you may consider it in your decision.

One critical question to consider in identifying a target journal is who you most want to reach with your findings.[133] If your paper tests a clinical application of a medical technique, then a medical journal may be the best choice because clinicians read these journals. But if your paper presents findings that lend themselves to policy, then it may be better to select a journal with a policy focus or one that includes policy makers in their core readership. Some articles may be better suited to a broader readership, whereas others will be relevant to a narrower group of readers. Keep in mind that journals associated with a professional society or association, such as *American Journal of*

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factor because the editorial board does not believe impact factor is a reliable or useful metric (for example, PLOS ONE[451]).[9]

Tropical Medicine and Hygiene (the official journal of the American Society of Tropical Medicine and Hygiene), will likely have a more topically focused and consistent readership compared to more general journals such as PLOS ONE. The core readership of a journal, which is often described on a journal's website, will help you reach those who are interested in your work and those who are in a position to apply your findings.

However, if you are unsure of where to start in identifying potential journals, try the four suggestions shown in Box 14.1 to identify a preliminary list and then continue to the next section to further consider each candidate journal.

Box 14.1. Four Strategies for Identifying a Preliminary List of Target Journals

1. Use the online journal finder called Journal Author Name Estimator (JANE; https://jane.biosemantics.org/). Go to the website and paste your title and abstract into the search box. The results will show a list of journals that may be a good fit for your paper.
2. Enter your paper's keywords into a database such as PubMed (though JANE uses PubMed in its algorithm, the first two strategies will yield different results).
3. Look in your paper's reference list for ideas about target journals for your particular topic. Once you have three sets of journals from the above strategies, compare them for overlap. Journals that show up in two to three of the results lists may be a good fit.
4. Once you have identified a short list of around three to five potential journals, it's a good idea to run them past your mentor or the senior author on the paper for their input.

Narrowing Down Your Choice for a Target Journal

Once you have a short list of potential journals, further investigate them to narrow your choice. You can learn more detailed information about a journal's scope (the topics on which they publish) usually in a section called "About this journal" or something similar. If the journal's scope seems to fit with your paper's topic, investigate the core readership of that journal, comparing it to the most desirable readership for your paper.

If the scope and readership fit your needs, consider your study's strengths and weaknesses. Every study has them, and you should reflect on yours when choosing a target journal. For example, if you did a study on exercise in pregnancy and your measure of exercise was a bit flawed, then you probably want to avoid journals that focus on research related to exercise. Journal peer reviewers and readers of an exercise journal will likely scrutinize the way that you measured exercise in your study. So, in this scenario, it's probably better to choose a journal focusing on a different topic area—perhaps a pregnancy journal instead of an exercise journal—or even a more general journal may be a good choice. Alternatively, reflect on your study's strengths and align your journal choice with them.

Also review the journal's article categories (e.g., original research, review articles, commentaries, etc.) and the maximum allowed number of words, figures, tables, and citations for each article type. Sometimes a word limit can make or break your decision to target a journal.

Further, it's important to avoid predatory journals, which are dishonest journals or publishers who publish papers with little or no real peer review.[452] While some predatory journals may publish real papers, none offer rigorous peer review; they are more

interested in taking your money than producing a high-quality product. You may have received an email from one of these journals inviting you to submit. It may look tempting when you get an email like this, but publishing in a predatory journal can hurt your career.[452] Once you publish in a predatory journal, there's no way to reverse the process. See Box 14.2 for tips on avoiding predatory journals.

Box 14.2. Strategies to Avoid Predatory Journals[453–455]

To avoid predatory journals, consider the below questions. No one single question will help you identify a predatory journal, but collectively these questions will help you make a judgement about the integrity of a journal you may be considering.

Have you heard of or cited the journal before?

- A journal your research community is already citing and engaging with may be more likely to provide a positive author experience.

Is the journal unfamiliar but has a similar name as an established journal?

- Some journals pick a name similar to a more established journal in an effort to confuse authors and draw submissions.

Does the journal list any metrics?

- A journal with an impact factor has been evaluated by outside sources. Note that journals do not get an impact factor until they have published for 3 years, so a newer journal will not have one. Metrics such as impact factor should be accessible on a third-party site.

Is it indexed in databases such as SCOPUS, Web of Science, or PubMed Central?

- Journals are vetted before being admitted to notable databases. This shows that other experts hold a favorable opinion of them.

Is unrealistically quick peer review or publishing turnaround being offered?

- Peer review that is too quick is less likely to provide thorough feedback. In addition, publications can use this to take advantage of authors' need to publish.

Do published papers align with the journal's stated scope?

- Many off-topic papers may suggest that the journal is not thoroughly vetting submitted content.

Does the journal have a professional website?

- A professional website is a sign that a journal is investing resources into showcasing its authors' papers.

Does the website clearly list peer review and copyright policies?

- Clear policies will ensure you know what to expect and are aware of your rights as an author.

Does the journal have an active website and/or social media activity?

- These tools are "green flags" that a publication is active. Newer or under-resourced journals may not have these but may still be reputable, however.

Do emails you receive from the journal have a generic or an incorrect greeting?

- An incorrect name or honorific could be a sign that you're being contacted as part of a mass mailing list not tailored to you or your research interests.

Do emails from the journal use overly complimentary language or try to win you over by flattery?

- Reputable journals generally do not need to push or flatter authors to submit articles.

Does the email create a false sense of urgency?

- Legitimate journals should not contact you unexpectedly with unrealistic deadlines for submitting a paper.

Does the email address match the journal's web domain?

- Double checking this information can help you avoid scams and phishing attempts.

Is the email written correctly in the language in which the journal publishes?

- Like a well-written website, nicely crafted emails are a positive sign of attention to detail.

Still other factors that may be relevant are the cost of open access publishing. Open access scholarly literature is free of charge to read and often carries less restrictive copyright and licensing barriers than traditionally published works.[456–459] Some journals offer the option to pay for open access and other journals only offer open-access content. In either case, authors must pay an open-access fee; however, this fee is often waived for authors living in low-income countries.[459]

Some researchers post their articles as preprints before seeking publication in a peer-reviewed journal. Preprints are a non-peer reviewed version of a manuscript that have been deposited into an official preprint server,[465] such as medRxiv, Research Square, or First Look. The use of such preprint servers in the health sciences became popular in 2013 during the Ebola epidemic when researchers needed to get information out quickly.[461] It is free for authors to post on such platforms and manuscripts are made available to a wide readership immediately. In practice, papers often are simultaneously submitted as a preprint and publication in a traditional scholarly journal.[460,461] Be aware that while many journals will consider articles that have been posted as a preprint (or

even offer to post your submitted article in a preprint server), others prohibit publication of articles that have previously been deposited into a preprint server. See Box 14.3 for a fuller description of considerations for posting your article as a preprint.

Box 14.3. Strategy to Decide Whether to Post a Preprint[460–462]

Below, different motivations for posting a preprint and things to be aware of when deciding whether to post a preprint are described.

Motivations for posting preprints:

- Preprints make findings immediately available to the scientific community.
    - Journal peer review is slow—it can take up to 2 years from initial submission to the final publication—and preprints can advance science faster.
    - Author(s) can use a preprint to claim research as theirs prior to (and more quickly than) publication in a peer-reviewed journal.
- Preprints allow you to cite your work before publication in some circumstances.
    - Preprints may be allowed to be cited in grant applications (check the guidelines for specific funders).
    - Preprint citations may serve as placeholders for eventual journal citations in the first round of review when writing follow-up papers.
- Preprints are free to read, and they are not removed upon publication in a peer-reviewed journal.
- Authors of preprints may receive feedback that can be incorporated into a peer-reviewed journal submission

Words of caution:

- Preprints are not formally peer reviewed through the traditional system, and are not viewed as high quality publications that will "count" toward your promotion. If you list them on your CV, they should be included in a "preprints" section, separate from your published, peer-reviewed work.
- Most journals will accept articles that have been previously shared as preprints (and some journals encourage preprints); however, some journals will not accept articles that have been archived in a preprint server.
- Check target journal's policies prior to submitting an article that you have previously shared as a preprint.
- Make sure that the VOR (version of record) of your preprint is the most up-to-date version of your paper.
- Many predatory journals target people who have submitted preprints, so be prepared for emails soliciting your work.

Finally, keep in mind that in certain circumstances, you may not identify an appropriate target journal early on. You may end up searching for a target journal after the paper is written. It's also possible that you will need to find a second-choice journal if you do not get accepted by your original target journal. In this case, you will need to revise your manuscript to reach your updated target journal's readership and formatting requirements.

Related Open-Access Resources

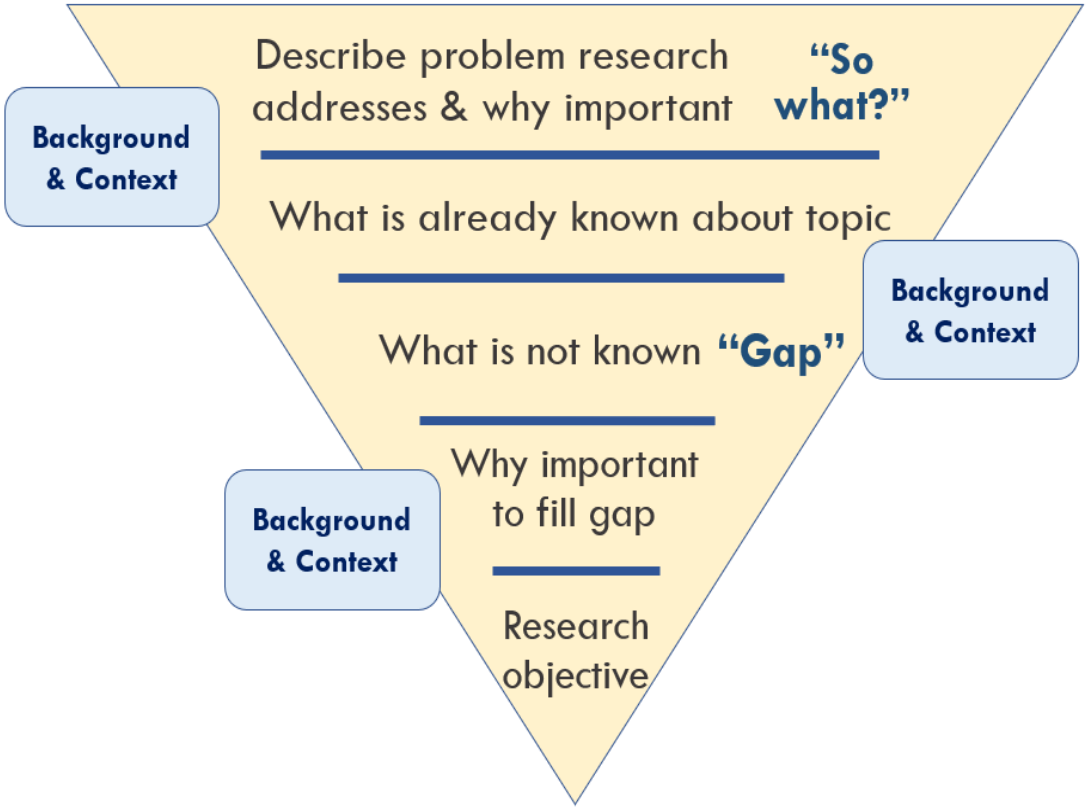
- The International Committee of Medical Journal Editors criteria for authorship and Disclosure of Financial and Non-Financial Relationships and Activities, and Conflicts of Interest is a current standard in publishing.
- The Committee on Publication Ethics (COPE) Authorship and Contributorship Guidelines is an additional trustworthy source on authorship standards.
- Frassl MA, Hamilton DP, Denfeld BA, de Eyto E, Hampton SE, Keller PS, et al. Ten simple rules for collaboratively writing a multi-authored paper. PLoS Comput Biol 2018;14(11): e1006508. ttps://doi.org/10.1371/journal.pcbi.1006508
- Albert T, Wager E. How to handle authorship disputes: a guide for new researchers. The COPE Report 2003. https://doi.org/10.24318/cope.2018.1.1
- JANE (Journal Author Name Estimator) is a resource to help authors choose potential target journals.
- Many university libraries, for example Harvard Library, have free guides on preprints and open access publishing.
- Identify trusted publishers for your research. Think. Check. Submit.

Chapter 15: Setting the Stage With a Clear and Compelling Introduction

Purpose of the Introduction Section

The introduction sets up the paper— it helps readers understand the need for the study, as well as describing the larger context for it. It ends with a presentation of the objectives describing the study goals.[117,133,431,435,463] The typical five arguments and overall structure for an introduction section are shown in Figure 15.1, but bear in mind this structure is not prescriptive, and there may be good reasons to deviate from it. At the same time, notice how background and context are presented throughout the section to set the stage.

Figure 15.1. Introduction Section: Overview of Standard Arguments and Structure[431]



Introduction Section: Details About Standard Arguments and Structure

Your introduction section should only include information relevant to your topic and reasons you undertook the research. By the end of the introduction, your readers should be interested in reading further to learn more about your study. Below, the five standard components (arguments) are described and additional considerations are discussed.

In the first part of your introduction, describe the problem your research is meant to solve and argue why it is important.[464–466] This argument is sometimes referred to as the "So what?" argument; in other words, it should explain why we (the readership) should care about your research. Frequently, the importance of a health condition is characterized in terms of how widespread it is and the suffering and mortality associated with it, as well as associated financial or other costs.

Next, the introduction should briefly summarize what is known and not known about your research topic.[464,465] The goal here is to argue that enough is already known to warrant your research and your research topic is promising based on what research has already been done, while also identifying an important gap in the research (i.e. what is not known about it). You should explain why this gap needs to be filled; this part should be short and should *specifically* relate to your question of interest. A lack of research on a topic is not a good justification for doing the research. Instead, describe the outcome that can be realized with your study. Why will it be helpful? You may want to appeal to specific future research or policy applications.

The introduction section typically ends with a description of your research objectives.[464–466] These objectives should make clear how they address the gap you identified earlier (for more on research objectives, see Chapter 16).

Throughout your introduction, provide enough background information to help your target journal readers understand the content and terminology in your paper.[431,465] Background is distinct from what is known about the research question, as background is not necessarily tied directly to the research. Background information might include definitions of terms or concepts and should be geared toward your primary readership. For example, if your paper is about electronic cigarette use in pregnant teens and you are targeting a pregnancy journal, describe and define electronic cigarettes. In practice, the background sometimes overlaps with the context and what is known.

Contextual information helps to paint a picture of the study's setting and population. If your study on electronic cigarettes and pregnancy was carried out in Denmark and you are targeting an international journal, you should explain contextual information such as whether there are age restrictions on electronic cigarette use in that location.

One thing to be aware of when writing your introduction is that the major arguments in the introduction section may overlap; that is, sometimes one statement makes multiple arguments, and they are not always presented precisely in the order above. This is completely acceptable. In terms of length, the introduction section is often three to six paragraphs long. Looking at examples from your target journal is a good way to gauge the target length for your introduction. Finally, authors typically use present tense for the introduction because they are describing the current state of research in a

given topic area. Authors may, however, use past tense to describe examples of research findings, and switch to present tense to make generalizations about the topic.

In the next section, I present an annotated example of a published introduction section. The example shows how the standard arguments and structure appear in a high-quality publication (Figure 15.2).

Figure 15.2. Annotated Example of an Introduction Section. The Article[114] Is Shown on the Left. Annotations Are on the Right in Boxes: Standard Arguments Are Shown in Yellow Boxes and Style, Story, and Other Features Are Shown in Clear Boxes.

INTRODUCTION

Cervical cancer (CC) is preventable with appropriate screening and treatment. Pap smears, the most common form of screening, allow physicians to detect and manage pre-cancerous lesions before they develop into CC.[1]

Because of the success of screening programs that use the Pap smear, CC rates are low in most high-income countries.[2,3] Nonetheless, CC is the third most common cancer worldwide and a leading cause of death among women in low- and middle-income countries (LMICs).[4] Unfortunately, Pap smears are infrequently used in LMICs because they are expensive and require physicians, pathologists, and cytotechnicians to perform the procedure and interpret the results.[3,5] Even in LMICs with screening programs, rates of participation tend to be low[6] because Pap smears must be collected and analyzed at hospitals or other high-resource health facilities that women may not have access to.

In addition, if women have abnormal results, they must return for follow-up assessment and/or treatment, which creates greater time and financial burdens.[7] The logistics of sample collection by health care providers, which then must be sent to laboratories, tested, and returned, can also be challenging in these settings. There are also cultural barriers that preclude the use of screening methods associated with sexually transmitted diseases (STDs).

Describe problem, What is known

The first paragraph introduces the problem (cervical cancer). It also establishes what is known about the research question: that Pap smears can prevent cancer. The authors implicitly argue that we should care about proper screening, because it can spare women the disease. The citation, authored by the well-respected Mayo Clinic, provides credible evidence to support this claim.

What is known, So what? Research gap

Additional information is provided in the second paragraph about what is known. The authors argue that a higher prevalence of cervical cancer exists in low- and middle-income countries (LMICs) because the highly-effective pap smear is not available. Their claim that cervical cancer is a leading cause of death in women in LMICs is an argument about why we should care about this research topic. This claim is both a logical argument (supported with data in reference 4) and an emotional argument that this disparity in available screening causes unnecessary death from a preventable cancer*. Finally, the fact that there is limited effective and available screening approaches in LMICs is the research gap.

*See section on Aristotelean arguments in Chapter 3

Background and context

Through their description of the setting throughout the introduction, the authors convey how cervical cancer screening fits in the context of LMICs and Guatemala. This information helps readers picture where this "story" happened. The contextual information is undoubtedly richer because three of the authors are affiliated locally or regionally. For example, the insights about the logistics of the healthcare system and the values of local people are insights that only local researchers would have. The setting is a key part of this study, and it cannot be fully understood without the context.

Appeal to readers about why they did research

Explaining to your readers why you are telling a story or recommending a specific action appeals to your readers because it provides a concrete purpose and/or application of the research. Throughout this introduction, it is clear that this research was done to provide greater access to a low-cost, effective cervical cancer screening test that will save lives and reduce suffering in low-resource settings.

Hence, many LMICs have adopted CC screening programs that use visual inspection with acetic acid (VIA). VIA involves placing acetic acid on the cervix and looking for a change in color to detect lesions. This procedure is less costly and invasive than Pap smears and can be performed by trained laypersons in low-resource health facilities.[7-9] In addition, VIAs give the option to treat women with cervical lesions immediately. Thus VIA is often called a "see/screen-and-treat" or "one-visit" approach.[7] Previous studies have shown that VIA screening helps reduce CC incidence and mortality in low-resource settings.[8] However, VIA shares some of the same barriers associated with Pap smears, so despite these efforts, CC incidence and mortality remain high in many LMICs, presumably because of persistent low rates of screening with either approach.

Human papillomavirus (HPV) infections are responsible for more than 90% of CC cases.[10,11] There are 13 types of high-risk HPV associated with development of CC.[12] Of these, types 16 and 18 account for approximately 70% of all cases.[13] Cervical HPV tests have high sensitivity (approximately 90%) and specificity (> 80%).[14,15] Women who test positive for high-risk HPV should follow up with a Pap smear and/or VIA or treatment, depending on each country's setting and resources,[16] but a negative test means the risk of developing CC in the next few years is minimal, lower than the risk after a negative Pap smear.[17] Furthermore, when Pap smears are performed only on women who have tested positive for HPV, the relatively low sensitivity of screening by using Pap smears is significantly improved.[15,18] Thus, primary screening for high-risk HPV before referral for Pap smear or VIA has been proposed as an alternative CC screening method. Unfortunately, HPV testing is expensive and requires infrastructure not readily available in many LMICs. Nonetheless, research is underway to develop low-cost HPV tests that can be used with minor infrastructure requirements.[19-23]

Use connective words

Connective words and phrases create links within the text, creating a more story-like feel. The word "hence" connects this paragraph describing less resource intensive screening methods like VIA with the previous paragraph that detailed barriers to more resource intensive methods.

What is known

The authors argue that visual inspection with acetic acid is somewhat more suitable for cancer screening in low-income settings and refer to what is known about barriers to implementation.

Avoid technical language

Note the nicknames used to describe VIA, including the "see/screen-and-treat" and the "one visit" approach. These nicknames are easy to understand and remember and avoid lengthy or technical explanations.

Background and context

Understanding the links between human papillomavirus and cervical cancer is critical to help the reader understand the research study. Though the readers of this journal (The Journal of Global Oncology) will be familiar with certain types of cancers, they may not know much about cervical cancer, and the authors appropriately explain such background throughout.

Self-collection HPV kits have been developed to allow women to collect their own cervicovaginal samples at home and send these to a testing facility through the mail or by other means. Studies in several countries have compared the accuracy of HPV self-collection samples with samples obtained by a physician and have assessed the acceptability of self-collection in different populations.[5,24-30] Some studies have provided women with self-collection kits, but at medical facilities before collection by a physician rather than at the woman's home. In these studies, self-collection has been shown to have sensitivity similar to that of physician-collected samples,[5,24-28] and self-collection has been found to be highly acceptable in many settings.[24,26-28,31] This suggests that self-collection could be helpful to increase CC screening rates in LMICs, once cost- and infrastructure-efficient HPV tests have been developed. However, few studies have provided participants with the opportunity to try these in community settings outside of medical facilities; thus, it is not clear whether they would be an accepted form of primary CC screening.

Guatemala has one of the highest levels of CC morbidity and mortality in the region. Age-standardized annual incidence and mortality rates are 22.3 and 12.5 per 100,000 women, respectively,[11] largely because less than 40% of Guatemalan women (who have a relatively high prevalence of HPV[32-34]) have ever been screened for CC.[6,35] There have been self-collection studies conducted in Latin America, a region in which CC morbidity and mortality are particularly high,[5,36-39] although few have tested the acceptability of HPV self-collection in community rather than clinical settings. Moreover, HPV self-collection has not been studied in indigenous populations in Latin America, who tend to have less access to health facilities and higher levels of stigma associated with physician-administered vaginal and STD tests.[40] Thus, it is important to assess the acceptability of HPV self-collection kits and tests and determine the potential of HPV testing as a screening modality in these settings.[37] We thus conducted a cross-sectional study in an indigenous population in Lake Atitlan, Guatemala, to assess knowledge of HPV and CC, provide women with the opportunity to collect a self-sample in their home and report their feelings and experiences, and assess HPV prevalence in indigenous populations.

What is known

This paragraph about the feasibility and efficacy of self-collection HPV kits argues that the self-collection kit evaluated in this study has promise. This text sets up that HPV screening has the potential to be successful in Guatemala for the purposes of cervical cancer screening. The authors do a good job making the case that the self-collection approach is promising but not yet explored enough to draw firm conclusions about its accuracy and feasibility.

Research gap

This sentence argues that the HPV self-collection kit approach for cervical cancer screening has not yet been tested in the community. The sentence follows an argument that the approach has promise and begins with the word, "however" to alert the reader that the argument is shifting to point out the missing knowledge in what has previously been described.

So what? Importance of filling the gap

The high cervical cancer morbidity and mortality in Guatemala and low screening are compelling arguments that the research study is important and needed. The citations to support these claims include those authored by the American Cancer Society and others that appear in credible publications such as the Bulletin of the World Health Organization. This type of high-quality evidence from well-respected organizations lends credibility to their claims.

Use active writing

Passive writing does not make clear who is performing an action. Because active writing provides more information, it is easier to understand. It is also a more lively and engaging way to connect with your readers, helping writers create a story. Through referring to themselves in the text via the pronoun "we," the authors make the text active and feel like a story with their team as the storyteller.

Research objective

The research objective describes their study and includes the study design, the location, the study population, and study outcomes.

Common Introduction Section Pitfalls and How to Avoid Them

Below, I describe some common pitfalls that writers face in developing their introduction sections and solutions to help you avoid them.

PITFALL #1: Justifying Research With Primacy Claim

Description: Justifying the need for your research by claiming that your author team is the first to investigate a question (or that little is known about the topic). The fact that someone else has not yet investigated a particular question or that very little research exists is not a good justification for doing a study. In fact, some journals (such as *Emerging Infectious Diseases*) explicitly prohibit claims of "primacy": that a research team was the first to investigate a particular research problem.[467] Additionally, stating that there is a need for research on your topic area is not a good justification for your research.

Solution: Articulate why your research is needed by describing the outcome that will be realized if the problem your research addresses is solved.[468] For example, instead of "There is no research on the association between electronic cigarette use and pregnancy outcomes in teens," you might point out the potential benefits of understanding the connections, highlighting what is known from other studies (perhaps about other tobacco products). A good description of the need for this research may be that a better understanding of the health effects of electronic cigarettes in pregnant teens can guide physicians in making better recommendations for their pregnant patients, potentially helping them to avoid harm.

PITFALL #2: Generic Arguments to Justify Research

Description: Generic arguments about the need for your research that are not tailored to the readership you are trying to reach (the core readership of your target journal).

Solution: Frame your argument in terms of what is important to your core readership. For example, if you are writing to a policy readership, you might emphasize a point about government programs. If you are writing for a clinical readership, you may emphasize relevance to a hospital setting or clinical practice. If your readers are epidemiologists, you could emphasize the ability to gain a more accurate measurement, one that is low cost but minimizes misclassification. Of course, if you are writing for a journal with a diverse readership such as PLOS One, your framing will be less tailored. To identify your target journal's core readership, visit their website.

PITFALL #3: Incomplete Introduction

Description: Writing an incomplete introduction that does not discuss one or more aspects of your research objectives.

Solution: Discuss and set up all aspects of your objectives, including the setting and population. For example, if your study population is teens, then you should discuss and cite studies that include teens. If one of your objectives is to evaluate the effect modification of age in the association between electronic cigarette use and pregnancy outcomes, then you should discuss what is known and not known about this association.

PITFALL #4: Missing Citations

Description: Making claims without providing supporting citations; alternatively, citing studies that do not provide persuasive evidence to support your claim.

Solution: Support a claim if it can be debated. Consider different types of citations for different types of claims. If you are making a causal claim, (that one factor causes an outcome) cite systematic reviews of randomized controlled trials or other study types that provide the strongest support for causal associations. If your argument is that the problem you are addressing is an important public health issue, follow the annotated example above and cite a large public health organization's report stating this goal. The objective is to lend credibility to your claim, either with the type of evidence, the amount of evidence, and/or the fact that credible bodies (governments, large organizations) support your claim. Finally, cite the most up-to-date references available, showing that you have built on the field's most up-to-date research.

PITFALL #5: Uninformative Subheadings

Description: Using subheadings like "literature review" in your introduction (and throughout your paper) is a missed opportunity, as they do not summarize key arguments or make specific points.

Solution: Craft subheadings in your introduction as a summary of the argument you are presenting in that section. For example, instead of "literature review" you might include a section header that reads "Electronic Cigarette Use Has Increased Dramatically in Teens." Note that not all journals allow subheadings in the introduction section of their manuscripts. I do, however, recommend this approach for each section of your paper as appropriate.

Related Open-Access Resources

- Luby S. Southern DL, The pathway to publishing: A guide to quantitative writing in the health sciences. https://doi.org/10.1007/978-3-030-98175-4.

- Busse, C., August, E. How to Write and Publish a Research Paper for a Peer-Reviewed Journal. *J Canc Educ* **36**, 909–913 (2021). https://doi.org/10.1007/s13187-020-01751-z
- Mensh B, Kording K Ten simple rules for structuring papers. PLoS Comput Biol 2017;13(9): e1005619. https://doi.org/10.1371/journal.pcbi.1005619
- Zelner J, Broen K, August E. Backward paper writing for the data sciences. Patterns; 2022; 3(3). https://doi.org/10.1016/j.patter.2021.100423
- Equator Network is a website containing a collection of writing guidelines and checklists for different types of papers.
- Free, online platforms such as AuthorAID provide a range of scientific writing and publishing resources.
- The University of Manchester Academic Phrasebank provides example phrasing for language used in academic papers

Chapter 16: Crafting Your Research Objectives

The research objectives should describe the goals of your study and provide a foundation on which your paper is built.[133,465] Be sure your objectives address the research gap you described earlier (see Chapter 15 for more on framing a research gap). Despite being just a couple of sentences in length, they are worth spending a bit of time crafting, rethinking, seeking feedback, and revising, as they are anchor points in creating your arguments. Consider seeking feedback from multiple colleagues and your mentor (if you have one) to get their take on whether your objectives are clear, specific, and complete. The objectives should argue that you are addressing the research gap you described earlier and that your research addresses an important need.[133,465] Figure 16.1 provides an overview of qualities that describe good research objectives.

Figure 16.1. Overview of Qualities That Make Good Research Objectives

Address the Need and Research Gap

Your objectives should address the need and the research gap described in your introduction section.

Clear

Your reader should understand what the study goals are after reading them.

Specific

They should describe what you evaluated in the study. Some studies will include one objective, and some studies will include more than one. Regardless, they should be concrete enough and narrow enough to be addressable in the context of your manuscript.

Complete

Include relevant information about your study; consider including the population, sample, independent and dependent variables, study design, timing, setting, and dataset.

Research objectives are written in a variety of ways, but most commonly as questions, aims, or hypotheses. Figure 16.2 provides samples of these three styles of research objectives.

Figure 16.2. Three Common Ways to Present Your Research Objectives

Note: Examples adapted from: Martins SB, Bolon I, Alcoba B, Ochoa C, Torgerson P, Sharma SK, Ray N, Chappuis F, Ruiz de Castañeda R. Assessment of the effect of snakebite on health and socioeconomic factors using a One Health perspective in the Terai region of Nepal: A cross-sectional study. *Lancet Glob Health* 2022;10:e409–e415.

Research Question

Example: What are the health effects of snakebite in the snakebite endemic region of Terai in Nepal?

Research Aims

Example: In this study, we assess the health effect of snakebite in the region of Terai of Nepal, a snakebit endemic region, using a One Health approach.

Research Hypothesis

Example: We hypothesized that the prevalence of snakebite in the Terai region of Nepal significantly increased from the period of 2000-2010 to the period of 2011-2020.

Common Research Objectives Pitfalls and How to Avoid Them

Below, I offer a list of common pitfalls writers face in crafting their research objectives and solutions to help you avoid them.

PITFALL #1: Vague Objectives

Description: Vague objectives that do not explain what you investigated, the study outcomes, the study design, timing, setting, or the study population. For example, the following objective is vague and does not provide enough information about the study: "Therefore, our study shed light on the IPOS, which captures a range of concerns prioritized by those with terminal illness."

Solution: Write a clearer, more specific, and more complete research objective. For example: "We evaluated the validity and reliability of the Integrated Palliative Care Outcome Scale that measures patients' main concerns, common symptoms, and patient/family distress in older patients with terminal illness in nursing homes across the southeastern USA."

The revised objective illuminates the study's goals of evaluating the validity and reliability of the named questionnaire, and it explains what the authors set out to do and what to expect in the rest of the paper. The makeover version is also more complete, including relevant information about the population, independent and dependent variables, study design, timing, and setting. While it is not necessary to include all of these elements for every objective, each should be considered. Lastly, the acronym in the vague version of the objective is likely to frustrate readers, which is discussed further in the next pitfall.

PITFALL #2: Abbreviations That Hinder the Reading Experience

Description: Using abbreviations throughout your paper demands mental energy from your readers, especially in your research objectives (see Pitfall #1 vague example) because readers often read them without first reading the introduction. In fact, most people do not read papers in chronological order.[4] It is frustrating as a reader to have to back track to find where the author set up an abbreviation. Using abbreviations can make it easier for us as writers, but they don't always make it easier for the reader and that should be your goal. Of course, in the above example, you do not have access to the full paper, which should have defined the abbreviation. Still, I recommend you avoid using an abbreviation in your research objectives unless it is very well known (e.g., HIV).

Solution*:* Do not abbreviate terms in your objectives (see revised example in Solution to Pitfall #1).

PITFALL #3: Overpromising in Your Objectives

Description: An objective that claims "to determine" an association suggests that a study can provide conclusive evidence of an association; however, a single study cannot do this. For example, it's not possible to determine the association between electronic cigarette use and harmful pregnancy outcomes with just one study. Therefore, this phrasing overpromises what you can accomplish in your paper. Conversely, I suggest avoiding objective wording like "to study" because it's not specific enough.

Solution: Choose a more specific verb for your research objective such as "evaluate," "describe," or "estimate."

PITFALL #4: Wordy Objectives

Description: Wordy language such as "The current study aimed to evaluate…" feels watered down, and the long wind up causes the research objectives to lose their energy.

Solution: Streamline to a simple yet punchy "We evaluated…" to keep readers' attention using active voice instead of passive voice (see Box 16.1)

PITFALL #5: Passive Voice

Description: Using passive voice for your research objectives (e.g., "The association between X and Y was evaluated.") has less energy and elicits less interest from readers compared to active voice. Passive voice is less likely to help readers see your paper as a story when compared to active voice.[78]

Solution: Use active voice in describing your research objectives, for example, "We evaluated the association between X and Y."

Box 16.1. Tip: What Is Active Voice? When Should I Use It?

You may have heard that active voice is better than passive voice, and it's true that many author guidelines ask authors to use the active voice where appropriate. Your research objectives should be written in the active voice. In the active voice, the *subject* is identified, usually early in the sentence, and it performs the action. Active voice feels more energetic than passive voice, and readers also feel more connected to the text because often it means the narrators (the authors) are mentioned ("We…").

- Active voice: "We estimated the prevalence of childhood malnutrition in Cox's Bazar, Bangladesh." Here, the subject is "we": the ones performing the action (in this case, the ones estimating something). In this active voice example, readers can connect with the narrator (the "we"), which can make the text feel more compelling—like a story.[78,428]
- Passive voice: "The prevalence of childhood malnutrition in Cox's Bazar was estimated." Here, we do not learn who performed the action and the sentence has less energy than the active voice. Passive voice here feels "drier" and less compelling.

Passive voice is okay to use in some parts of your paper. In fact, there are two situations in which passive voice can actually be a better choice.[435]

- *When the actor is not known, not relevant, or not obvious*

  Passive voice is often used for general statements in academic writing. For example, the sentence "The effect of water quality on childhood malnutrition

has been extensively studied" clearly refers to other researchers, but it is both unnecessary and not practical to name all of the researchers who have researched this association.

- *When the person performing the action is less important than their action* Sometimes the procedure is more important than the person who performed it; for example, "Water quality was quantified as the concentration of pathogens in the sample." In this example, the people who quantified the pathogens are less important than the quantification of the pathogens in the water.

Related Open-Access Resources

- Luby S. Southern DL, The pathway to publishing: A guide to quantitative writing in the health sciences. https://doi.org/10.1007/978-3-030-98175-4
- Equator Network is a website containing a collection of writing guidelines and checklists for different types of papers.
- Free online platforms, such as AuthorAID provide a range of scientific writing and publishing resources.
- The University of Manchester Academic Phrasebank provides example phrasing for language used in academic papers

Chapter 17: Describing and Justifying Your Research in the Methods

Purpose of the Methods Section

Your methods should provide enough contextual detail about how and why you carried out your study to enable readers to understand and interpret the results. The methods should also build the credibility of your study, instilling confidence that the results are the product of a rigorous and carefully conducted approach.[469]

In the methods section, you should explain how you carried out your study and justify why you used the methods that you did.[466,469] It's important to explain why you made decisions such as your criteria for selecting participants, your choice of assessments, why you used certain statistical approaches, and other decisions. This information provides important context and a deeper understanding of your study. Justifying your decisions, ideally with a rationale as well as citations, helps make the case that your research is sound and that your decisions are well-supported.

Where appropriate, argue that your study was conducted using the best available and most appropriate methods. In some cases, a study team may not have had access to the best available or most appropriate methods but instead relied on what was available. If one of your study methods falls short of the ideal, it's important to be honest about how you conducted the study. Transparency is essential to the scientific process, as it provides information for readers to judge for themselves how to interpret your results. Discussing the limitations of your methods in the discussion section can further explain and explore the implications of such limitations.

In theory, you should provide enough detail in your methods section to allow another researcher to replicate your study.[469] Replication allows scientists to draw

conclusions over multiple studies that have been conducted the same way, with the understanding that chance is less likely to play a role in results found consistently over various iterations and contexts. In practice, it is not always feasible to describe every decision and detail that culminated in your final results. The goal, then, should be to summarize your data collection protocol, to provide access to your data collection tools such as questionnaires or other measurements (either in the form of a citation or in an appendix), as well as to describe the details of your analytic approach. Your analytic approach should be explained in enough detail so that a trained statistician could perform a similar analysis if provided the dataset. You may also share your code and even your data as supplementary material if desired.

The elements included in a methods section depend on the study type and study design. For example, the methods section of a lab investigation will look very different from that of a clinical trial. This chapter (and in particular, Figure 17.1) focuses on typical methods for a cross-sectional study, and they include the components listed in the Equator Network STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) checklist guiding reporting for cross-sectional studies.[466] Recommended elements for other study types can be found at the Equator Network,[405] a free online library.

Figure 17.1. Methods Section: Overview of Standard Structure

Each element should be explained with enough detail to permit replication and each decision and approach should be justified with a reason and citation, where appropriate
• Study design • Timing (study dates and duration for longitudinal studies) • Setting (geographic setting and description of micro-setting such as school or hospital) • Study population from which sample was drawn • Dataset if used (e.g., Demographic Health Survey) • Sample size and sample size calculation • Eligibility criteria • Recruitment approach and sampling: where, how, and by whom participants were recruited, when and where informed consent took place • Data collection procedures including efforts to minimize potential sources of bias in collecting data • Data collection tools • Clearly describe variables including outcome(s), exposures, potential confounders, and effect modifiers and how you operationalized each • Laboratory methods and analysis • Data analysis (statistical and other methods to address each objective) • Ethical conduct • Ethical approval

The methods are often written in past tense because you are telling the reader what you did; however, they are commonly written in a mix of active voice and passive voice (see the first two sentences of the "Patients and Methods" section of the example article in Figure 17.2). While the active voice is more energetic and more direct, passive voice focuses on the facts and may seem more objective. Use the active voice in your methods to avoid confusion, clarify who the actors were, and to allow the study team to take credit for implementing the high-quality methods that produce credible results.[4] (For more on using active voice versus passive voice, see Chapter 16, Box 16.1.)

In the next section, I present an annotated example of a published methods section. The example shows how the standard structure appears in a high-quality publication.

Figure 17.2. Annotated Example of a Methods Section: The Article[114] Is Shown on the Left and the Annotations Are on the Right in Yellow Boxes.

PATIENTS AND METHODS

We conducted a cross-sectional study in Santiago Atitlan, an indigenous community of 45,000 residents in Guatemala. Data were collected by using electronic surveys and self-collection kits.

Study Population

This community is almost exclusively Tz'utujil, a Mayan indigenous group. We sampled 212 women age 18 to 60 years from nine neighborhoods that encompass 85% of the population of Santiago Atitlan. Population data were obtained from the local municipality. We followed a stratified sampling approach by first allocating samples of size N_c to each neighborhood according to its relative population size (c = 1,...,9) and then randomly selecting a sample of N_c blocks. One house was randomly selected per block, in which one woman was interviewed.

If more than one woman in a house was eligible, the woman who had the next upcoming birthday was selected. Only women ages 25 to 54 years were eligible to provide a self-collected sample for HPV testing because women outside these ages are not eligible to receive screening using Pap smears or VIA according to Guatemalan CC screening guidelines. Menstruating and pregnant women were also excluded from self-collection. We chose to interview women outside the screening range because, although the focus of the study was on acceptability, we were interested in learning about the health practices and risk factors for all adult women.

Survey

The survey component was designed by using the Qualtrics application. It included 143 questions about demographics, preventive health care practices, and HPV and CC knowledge and risk factors. The survey also assessed the acceptability of and feelings toward HPV self-collection. Questions were developed by using the STEPwise Approach to Surveillance (STEPS) survey, The University of North Carolina's Family Health Study Survey, and the University of Michigan's Michigan HPV and Oropharyngeal Cancer study.[35,41] Four trained community health workers (CHWs) fluent in Tz'utujil and Spanish conducted the surveys.

Study design, setting

The authors describe their study design here and offer a brief description of the setting. Notice that here and throughout this section, the setting is intertwined with the description of their methods. This is because this research study is totally embedded in the Indigenous community in their study location in Guatemala. The nature of this investigation would be very different if it were carried out in another location. Finally, notice that the first sentence is in active voice with a reference to "we." Referring to themselves as such gives the sense that they are telling a story about their research. The second sentence is in passive voice, placing the emphasis on the data collection approaches rather than the investigators.

Sampling approach, setting

The text explains how study participants were sampled. Note the detail provided in this section: it allows the reader to understand and replicate how the sampling was done. The careful strategy used to sample participants also inspires confidence that the results reflect the situation in the Guatemalan population under study.

Recruitment, eligibility criteria

Again, a very detailed description of their recruitment approach is provided. The authors use the word "because" in their rationale for interviewing women outside the screening age range. "Because" is a powerful word in scientific writing: it means the investigators are explaining *why* they made key decisions, and it helps them justify each approach and variable. Learning the rationale for these methods helps readers understand how to interpret the results. For example, the survey results are meant to reflect all adult women in the region.

Data collection approach, tools

Here, the authors comprehensively describe their survey, including the number of questions, type of data that were collected, and the approach used to develop questions. The three surveys that shaped this investigation's survey questions are listed and two papers are cited. The citations serve to provide additional information on these surveys but also lends credibility to their approach because these surveys are well known and of high enough quality to be published.

The team that administered the surveys is described. That these community health workers are referred to as "trained" and fluent in two local languages, makes the argument that they are competent and able to understand the local setting and communicate with study participants.

The survey was written in English and then translated to Spanish by native speakers from the study team. The survey was piloted in Guatemala City and in households in Santiago Atitlan. After each pilot, surveyor notes were reviewed and appropriate revisions were made. At the end of each day, surveys were uploaded to the server, ensuring that the participant's data could no longer be accessed, except by members of the study team.

Data collection tools, ethical conduct, and approval

The authors describe the process of piloting the survey and revising it based on what they learned in this phase. This further argues that they conducted a carefully planned study.

The details about ethical approval for this study are included at the end of the methods section. But information provided throughout the methods make the argument that study participants were treated ethically. Here, procedures to keep the study data confidential are described. These details make the argument that the investigators took their ethical responsibilities seriously and that the participants were treated with respect.

HPV Self-Collected Samples

We used Eve Medical HerSwab self-collection HPV kits. Each kit came with an instructions card written in Spanish with step-by-step infographs explaining the collection process. The CHWs were trained on the procedure and on how to explain the instructions to the participants in their native language.

Data collection procedures, tools

Similar to the examples above, this detailed description provides information about how the data were collected but also builds confidence that the study was conducted with rigor, engendering confidence in the accuracy and reliability of the results.

Upon interview completion, each eligible participant was asked about her interest in collecting a sample for HPV testing. If the participant agreed, the CHWs explained the instructions, and the participant collected a sample in a private room in the household. The collection kit comprised a plastic handle and brush. The woman inserted the brush into her vagina and then turned a crank on the handle to extend the brush. The woman then removed the brush and cranked it back by using the handle. She then returned the kit to the CHWs. Afterward, each participant completed a five-question survey assessing the level of ease and comfort associated with the collection and her willingness to self-collect periodically as a form of CC screening. Finally, CHWs encouraged participants to attend free VIA screening clinics at their local public hospital.

Ethical conduct

Here, the authors make clear that study participants were given a choice about whether to provide a sample for HPV testing, that they collected the sample in a private room, and that they were encouraged to attend the free VIA screening clinic at their local hospital.

Samples were sent to an independent, nonprofit laboratory in Guatemala City (Asociación de Salud Integral) for testing and were tested by using the Anyplex II[42] HPV-28 kit, which tests for 13 high-risk HPV types according to the International Agency for Research on Cancer classification,[12] as well as 15 low-risk types (Data Supplement).

Laboratory analysis

Enough detail is provided about the laboratory tests to enable replication. Additionally, the fact that the lab is independent from the researchers is highlighted. Such independence is not typically needed except in the case of research funded by a for-profit company (which is not the case here) or if the investigators don't have the capacity for doing the tests themselves.

To ensure the privacy and confidentiality of the participant's information, given the sensitivity of the survey questions and the HPV test, no contact information was collected in this pilot study; thus, participants could not be contacted by the study team with their results. Instead, participants were told to call for their results 10 days after collection by using an identification number. Announcements were made daily on the local radio for 1 month after the end of recruitment that reminded women to call for their results. Participants were informed only if they tested positive for one of the 13 high-risk types.

Ethical conduct

Here, the authors explain how confidentiality of participant data was ensured. Another, more subtle, way the authors argue they treated people in their study with respect is the use of the word "participants" instead of "subjects," which implies active and voluntary participation rather than passive acceptance.

Statistical Analyses

Post–self-collection survey questions were analyzed to determine the acceptability of HPV self-collection as a form of CC screening. Two additional outcomes were analyzed: positive HPV results and previous Pap smear or VIA results. Crude comparisons between these and relevant covariates were run by using log-binomial regression, and then models were run adjusting for other covariates. Statistical analyses were conducted by using SAS software Version 9.4 (SAS Institute, Cary, NC).

Data analysis

Study outcomes are clearly described here, along with the statistical approach used to evaluate them. Additional information about the covariates is provided for each finding in the results section.

Human Subjects Approval

The University of Michigan Institutional Review Board approved study protocols (HUM00096559). All participants gave oral, informed consent before participation. The consent was documented by signature from one of the CHWs.

Ethical approval

The details about the study's ethical approval are included here. Note that along with the study approval confirmation and number, the authors explain how the informed consent was provided, a critical part of ethical practice.

Common Methods Pitfalls and How to Avoid Them

Below, I describe common methods section pitfalls and solutions to help you avoid them.

PITFALL #1: Incomplete Methods Description

Description: The methods section does not describe the data collection or analysis approach for one or more objective or result.

Solution: Describe the methods used to produce every result and for all research objectives.

PITFALL #2: Failure to Justify Approach

Description: Methods do not justify why a decision was made, such as why a variable was operationalized as it was or why a particular statistical approach was used.

Solution: Justify why you chose your methodological approaches throughout the methods. For example, explain why you chose certain questionnaire score cut points to define categories such as "good knowledge, "poor knowledge," etc. Provide references as appropriate to support your justifications.

PITFALL #3: Failure to Include Original Questionnaire in Appendix

Description: You created your own questionnaire but have not described it adequately or included it in an appendix.

Solution: Describe any questionnaires you developed in the methods section and include them in an appendix to allow others to replicate the approach.

PITFALL #4: Results Reported in the Methods Section

Description: You report results such as the number of participants recruited, enrolled, and retained in the methods section.

Solution: Report the number approached to participate, the proportion eligible, the number enrolled, your final sample size, and the number of and reason for dropouts in the results section. These are considered the results of your recruitment approaches.

Related Open-Access Resources

- Luby S. Southern DL, The pathway to publishing: A guide to quantitative writing in the health sciences. https://doi.org/10.1007/978-3-030-98175-4.
- Busse, C., August, E. How to Write and Publish a Research Paper for a Peer-Reviewed Journal. *J Canc Educ.* **36**, 909–913 (2021). https://doi.org/10.1007/s13187-020-01751-z
- Mensh B, Kording K. Ten simple rules for structuring papers. PLoS Comput Biol 2017;13(9): e1005619. https://doi.org/10.1371/journal.pcbi.1005619
- Zelner J, Broen K, August E. Backward paper writing for the data sciences. Patterns; 2022; 3(3). https://doi.org/10.1016/j.patter.2021.100423
- Equator Network is a website containing a collection of writing guidelines and checklists for different types of papers.
- Free, online platforms such as AuthorAID, provide a range of scientific writing and publishing resources.
- The University of Manchester Academic Phrasebank provides example phrasing for language used in academic papers

Chapter 18: Highlighting Your Findings With Descriptive Results Text

The results section should summarize findings for each of your research objectives.[466,470] Throughout the results section, you should create arguments about patterns in your data and support these claims with your data and the results of statistical tests or other (e.g., qualitative) analysis.[470] Your job is to interpret the data for your readers because the data do not "speak for themselves."[4]

To help your readers easily navigate your results text and make your arguments clear, use descriptive subheadings.[427,429] For example, you could create subheadings that summarize each major finding of your paper as a structure to organize your results. When describing results that appear in tables or figures, avoid repeating each result shown and instead focus on highlighting patterns and referring your readers to the respective table or figure for more information. Also, be sure to cite and discuss each table and figure chronologically. Authors often use past tense to describe specific examples of research and then switch to present tense to make generalizations about the pattern of findings.

Figure 18.1. Results Section: Overview of Standard Arguments and Structure

Describe Results of Recruitment Efforts

Typically includes the number approached to participate, proportion eligible, number enrolled, final sample size, and number and reason for dropouts. Components will differ depending on study design (consult relevant Equator Network guidelines).

Describe Your Sample

Describe your sample including relevant characteristics of your participants.

Present Results for Research Objectives

Describe findings for each objective you posed. Results can be organized in the same order as you introduced your objectives or with the most exciting results first.

In Figure 18.2, I present an annotated example of a published results section. The example shows how the standard arguments and structure appear in a high-quality publication.

Figure 18.2. Annotated Example of a Results Section. The Article[114] is Shown on the Left. Annotations Are on the Right in Boxes: Standard Arguments Are Shown in Yellow Boxes and Style, Story, and Other Features Are Shown in Clear Boxes.

RESULTS

Of 481 women who were asked to participate through door-to-door recruitment, 212 women enrolled (44% acceptance rate), with 202 (95%) completing the survey. Ten women chose to withdraw, and their data were destroyed. Participants' mean age was 34.5 years, and more than 80% had primary education at most (Table 1). One hundred thirty-five women (67%) reported previous CC screening with Pap smears and/or VIA (Table 1). Women with previous Pap smear and/or VIA testing tended to be older, married, and with a higher number of children and pregnancies, suggesting that access to screening is strongly tied to reproductive care. Whereas only 31 participants (15%) reported previous knowledge of HPV, 188 (93%) were interested in and willing to collect a self-sample for HPV testing (Table 2). Of these, 178 (88%) were eligible and provided a sample.

Self-Collection Acceptability

Of these 178 women, 79% found the kit comfortable to use, and 91% found it easy to use. Upon collection, 100% reported that they were willing to use the test periodically as a form of CC screening, and more than 80% said they preferred to screen themselves at home rather than with a physician in a doctor's office (Tables 2 and Table 3). Because identifying information was not collected, the study team was unable to actively return results; however, more than 90% of participants called to receive their own results.

HPV Prevalence

Thirty-seven (21%) of 178 women tested positive for one of 28 types of HPV, and 31 (17%) tested positive for a high-risk type (Table 3). HPV 16 had the highest prevalence with seven women testing positive, followed by HPV 53 and 56 (six women tested positive for each), and HPV 59 (five women tested positive). Of the four strains with the highest prevalence, all except HPV 53 are high risk. Figure 1 shows the HPV type distribution in the study population.

Describe results of recruitment efforts

Here the authors describe the number of people approached, the number enrolled, and the number who completed the survey. Additionally, they enumerate the number of participants who withdrew, confirming that their data were destroyed.

Participant characteristics

Key demographic data are briefly summarized, and the reader is referred to Table 1 for more information. The authors highlight three key findings from the table (not shown) and the text does not duplicate what is presented in the table.

Interpret the results

Rather than letting the data "speak for themselves," the authors provide an interpretation of the pattern that women with previous Pap smear and/or VIA testing tended to be older, married, and with a higher number of children and pregnancies. They interpret this pattern, stating it "suggests that access to screening is strongly tied to reproductive care." This is not the kind of detailed interpretation that occurs in the discussion section, but it goes beyond reporting the results of statistical tests.

Present results for research objectives

The authors present results for each objective in separate sections. The authors start with what may be their most interesting finding: that the self-collection kit was well accepted by participants.

Connective words and phrases

Connective words and phrases create links within the text, creating a more story-like feel. The phrase "Of these 178 women" in the second paragraph links from the previous paragraph and helps readers keep track of number of participants in the final sample. This style feature helps the text feel more connected with a smoother flow.

Descriptive headings

The authors provide descriptive headings throughout the results, allowing readers to easily navigate the text and to summarize the information in each section.

HPV Prevalence

Thirty-seven (21%) of 178 women tested positive for one of 28 types of HPV, and 31 (17%) tested positive for a high-risk type (Table 3). HPV 16 had the highest prevalence with seven women testing positive, followed by HPV 53 and 56 (six women tested positive for each), and HPV 59 (five women tested positive). Of the four strains with the highest prevalence, all except HPV 53 are high risk. Figure 1 shows the HPV type distribution in the study population.

After adjustment, the association became statistically nonsignificant, but it did show a prevalence ratio (PR) greater than 1 (crude PR, 2.18; 95% CI, 1.07 to 4.43; P = .03; adjusted PR, 1.42; 95% CI, 0.68 to 2.97; P = .34; regression tables are provided in the Data Supplement).

Previous Screening

The use of health services was statistically significantly higher in women who had a previous Pap smear or VIA. Characteristics of women with and without a history of screening are presented in Table 5, and characteristics of women categorized by use of health services are presented in the Data Supplement. The final adjusted model included age and education level, as well as the HPV test results. The participants' use of alcohol, as well as other demographic factors, were considered but not included in the final model.

After adjustment, the association between use of health services and having had a previous Pap smear or VIA remained greater than 1 but was no longer significant (crude PR, 2.49; 95% CI, 1.26 to 4.93; P = .009; adjusted PR, 1.24; 95% CI, 0.93 to 1.66; P = .15; regression tables are provided in the Data Supplement).

Present main results as an argument supported by data, use of appropriate language

The authors first describe an unadjusted association –the number of lifetime sexual partners was significantly higher in women who tested positive for HPV–in words rather than leading with the statistical test result. They support this claim by referring readers to Table 4 for the statistical test result and *p* value.

Note that the direction of the association is clear: the authors specify that the number of lifetime partners was *higher* in those with HPV rather than stating that the number of lifetime partners was significantly associated with a positive HPV test result. The word "association" is appropriate given their study design.

Methods and results should be in sync and supplementary materials used as appropriate

Results from the final model are presented here, and the covariates are listed. The covariates are not listed in the methods because they evaluated and adjusted each model rather than having a pre-specified list of covariates. Additional detailed information is provided in the data supplement. This is a great option to present additional information that there is no room for in the main results section.

Present main results as an argument supported by data

A similar approach to presenting crude and then adjusted findings is used here. The arguments made about the associations are logical arguments because they are supported with the results of statistical tests.

Common Results Pitfalls and How to Avoid Them

Below, I describe common pitfalls that writers may face in developing their results section and provide advice about how to avoid them.

PITFALL #1: Missing Results

Description: One or more objectives do not have corresponding results.

Solution: Report results for all of your objectives, even if your findings are not significant. Non-significant findings are critical to share along with significant associations.

PITFALL #2: Missing Methods

Description: The methods for one or more results are not described.

Solution: Describe methods for each result presented.

PITFALL #3: Failure to Interpret Statistical Test Results

Description: Focusing only on the results of a statistical test without describing or interpreting the association. For example: "The linear regression showed a significant beta coefficient of -2.6; 95%CI: -5.5, -0.98, p = 0.03 for alcohol intake and blood pressure after adjustment for body mass index and smoking." This result is not adequately interpreted or described.

Solution: Describe the relationship of interest qualitatively. In this revised example, the regression coefficient and confidence interval are included, providing key information about the magnitude of the association and the precision of the estimate: "Consuming a greater number of alcoholic drinks per day was significantly associated with higher blood pressure, after adjustment for body mass index and smoking, with a regression coefficient of -2.6 (95%CI: -5.5, -0.98, p = 0.03)."

Alternatively, to more specifically interpret the regression coefficient, the finding could be presented as: "On average, consumption of each alcoholic drink per day was associated with a 2.6mmHg higher blood pressure (β: -2.6; 95%CI: -5.5, -0.98, p = 0.03), after adjustment for body mass index and smoking."

PITFALL #4: Failure to Make the Direction of an Association Explicit

Description: Not being explicit about the direction of an association; for example: "The number of alcoholic drinks consumed per day was significantly associated with blood pressure, after adjustment for body mass index and smoking, with a regression coefficient of -2.6 (95%CI: -5.5, -0.98, p = 0.03)." This type of result description can be confusing to readers or may simply make the results more work to read.

Solution: Be explicit about the direction of the association, even if you feel it is obvious; for example: "Consuming a greater number of alcoholic drinks per day was significantly associated with <u>higher</u> blood pressure, after adjustment for body mass index and smoking, with a regression coefficient of -2.6 (95%CI: -5.5, -0.98, p = 0.03)." (Note: Underlining was added as emphasis for clarification in the example; it would not be included in the actual text. Watch for this convention in the following examples.)

PITFALL #5: Confusing Description of Associations

Description: Using the terms "positive," "negative," and "inverse" to describe statistical associations. These terms can be confusing to some readers because they have a range of meanings and can sometimes depend on how data were coded. This is an example of such language: "The number of alcoholic drinks consumed per day was <u>positively</u> associated with blood pressure, after adjustment for body mass index and smoking, with a regression coefficient of -2.6 (95%CI: -5.5, -0.98, p = 0.03)."

Solution: More specifically and clearly describe an association; for example: "Consuming a greater number of alcoholic drinks per day was significantly associated with higher blood pressure, after adjustment for body mass index and smoking (β: -2.6 (95%CI: -5.5, -0.98, p = 0.03)."

PITFALL #6: Overinterpreting Data

Description: When you are reporting information from a survey, using language that overinterprets your data like this example: "Participants who drank four or more alcoholic drinks per day were more likely…" This language does not allow for the imprecision and error that is unavoidable with survey research.

Solution: Be precise when reporting survey data. A good example is: "Participants who reported drinking four or more alcoholic drinks per day were more likely…" This language accounts for the fact that you cannot precisely measure someone's behavior in a survey. For data that have been collected via observation, use language such as "Participants who were observed…" to be as precise as possible.

PITFALL #7: Subheadings That Focus on Statistical Tests Rather Than Associations

Description: Using subheadings that only describe the statistical approach used without providing qualitative information about the content in that section; for example, a results subheading such as "Logistic Regression Results."

Solution: Use a subheading that helps readers navigate your results and provides a summary of the content in the section. A better version of the above example would be: "Associations Between Alcohol Consumption and Blood Pressure." Alternatively, you

could craft a subheading that summarizes the pattern described in the section; for example: "Greater Alcohol Consumption is Associated With Higher Blood Pressure."

PITFALL #8: Inappropriate Implications About Study Timing

Description: Using the terms "increased" and "decreased" to describe cross-sectional associations. Reporting that an increase in one variable was associated with a decrease in another variable implies changes over time. For example, a cross-sectional association should not be described as such: "Consuming an increased number of alcoholic drinks per day was significantly associated with an increase in blood pressure, after adjustment for body mass index and smoking, with a regression coefficient of -2.6 (95%CI: -5.5, -0.98, p = 0.03)."

Solution: For studies with data at one point in time, use "higher," "greater," or "lower" to describe associations. For example: "Consuming a greater number of alcoholic drinks per day was significantly associated with higher blood pressure, after adjustment for body mass index and smoking, with a regression coefficient of -2.6 (95%CI: -5.5, -0.98, p = 0.03)."

PITFALL #9: Inappropriate Use of Term "Rate"

Description: Referring to a *value as a rate* when it is not a rate. For example, the result that 78% of those contacted enrolled in your study is not a response rate. A rate is a measure of the frequency with which an event occurs in a defined population over a specified period of time.[471]

Solution: Refer to rates correctly. Rates should all include a time component. For example, incidence rates describe how quickly a disease occurs in a population. Birth rates provide a sense of the number of births in a specified population over a specified

time period. For example, the 2020 birth rate for the United States was 11.0 per 1,000 women.[472] A proportion, on the other hand, compares a part to the whole. It is a type of ratio in which the numerator is included in the denominator. A proportion may be expressed as a decimal, a fraction, or a percentage. Therefore, the result that 78% of those contacted enrolled in your study can be presented as a response proportion.

PITFALL #10: Inappropriate Use of Causal Language

Description: Language that implies that an association is causal when circumstances do not support causality. For example, for a cross-sectional study, the following result would not be appropriate: "Consuming a greater number of alcoholic drinks per day significantly impacted blood pressure; after adjustment for body mass index and smoking, greater alcohol was significantly associated with higher blood pressure (β: -2.6; 95%CI: -5.5, -0.98, p = 0.03)."

Solution: Use words like "associated" or "related" as appropriate. For example: "Consuming a greater number of alcoholic drinks per day was significantly associated with higher blood pressure, after adjustment for body mass index and smoking, with a β of -2.6 (95%CI: -5.5, -0.98, p = 0.03)."

PITFALL #11: Unclear Presentation of Percents

Description: Presenting percents without the numerator and denominator can be unclear. For example: "… and 61% of those invited to join the study enrolled."

Solution: Provide the numerator and denominator to provide clarity. For example, "… and 61% (205/336) of those invited to join the study enrolled." This more complete presentation of your data can also help you catch errors.

PITFALL #12: Excessive Decimal Places

Description: Including excessive decimal places where they are not necessary. For example, the decimal places in the following result are probably unnecessary and feel bulky and distracting: "…76.24% of the participants were female."

Solution: Consider whether a decimal place is needed and present your results accordingly. For example, the above example would be better presented as: "… 76% (256/336) of the participants were female."

Related Open-Access Resources

- Luby S, Southern DL. The pathway to publishing: A guide to quantitative writing in the health sciences. Springer; 2022. https://doi.org/10.1007/978-3-030-98175-4
- Busse, C., August, E. How to Write and Publish a Research Paper for a Peer-Reviewed Journal. *J Canc Educ.* 2021; 36:909–913. https://doi.org/10.1007/s13187-020-01751-z
- Mensh B, Kording K. Ten simple rules for structuring papers. PLoS Comput Biol 2017; 13(9): e1005619. https://doi.org/10.1371/journal.pcbi.1005619
- Zelner J, Broen K, August E. Backward paper writing for the data sciences. *Patterns.* 2022; 3(3). https://doi.org/10.1016/j.patter.2021.100423
- Equator Network is a website containing a collection of writing guidelines and checklists for different types of papers.
- Free online platforms, such as AuthorAID, provide a range of scientific writing and publishing resources.
- The University of Manchester Academic Phrasebank provides example phrasing for language used in academic papers.

Chapter 19: Complementing Your Results Text With Figures and Tables

Purpose of Visual Elements

Visual elements such as figures and tables should summarize your results in an efficient, interesting way that will capture readers' attention.[133,470] Figures and tables are in many ways the centerpiece of a paper, as they are a way to package and highlight your most important findings. Further, if you want to promote your paper, visual elements can also be used in social media posts and to capture the attention of journalists.

At the same time, figures and tables should be used judiciously in your paper; be sure that each directly addresses your research objectives.[133] If not, do not include them or consider adding them to your supplemental materials. Additionally, identify the message you want to convey with each figure or table: ideally, each should only convey one message.[133]

As discussed in Chapter 18, the data presented in your figures and tables should be coordinated with your results text. The text should make an argument about patterns that can be identified through looking at your visuals; as such figures and tables should be self-contained, presenting all the details necessary for readers in the figure legend or table title to understand the visual element without consulting the text.[133,470] To this end, include an informative figure legend or table title that includes who (describe the participants), what (describe the information shown), when (dates when the data were collected), where (location where the data were collected), and how (explaining the analytic approach you used to generate the results). Additionally, label the axes, include footnotes with abbreviations and information on statistical tests where relevant, and also be sure to include units of measure.

In the example bar chart shown in Figure 19.1, the Y axis is clearly labeled, indicating that the bars represent the percent of participants falling into one of the migraine frequency categories, and the bars are also labeled (boys and girls). The colors do not stereotype participants into gender categories (i.e., they are not blue and pink for boys and girls, respectively), and they are also color-blind friendly due to the high contrast between the colors used. Finally, the figure legend includes who (children with anxiety and regular migraines), what (migraine prevalence), when (2025), where (the United States), and how (frequency).

Figure 19.1. Example of a Good Visual Element: Bar Chart

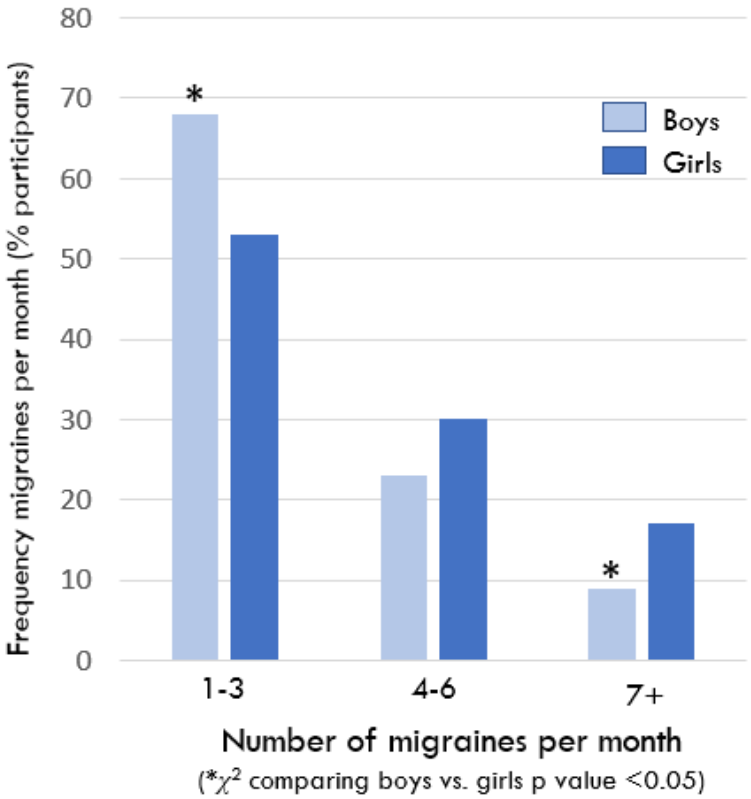


Figure X. Frequency of Migraines Per Month Among 1685 Children With Anxiety and Regular Migraines in the United States, 2025

The map in Figure 19.2 shows coverage of vitamin A supplementation across India in children. The map uses an intuitive and color-blind friendly color scheme: darker colors represent higher values. This scheme allows readers to quickly identify that vitamin A supplementation is better in the southern regions and patchier in the north.

Figure 19.2. Examples of a Good Visual Element: Map and Legend

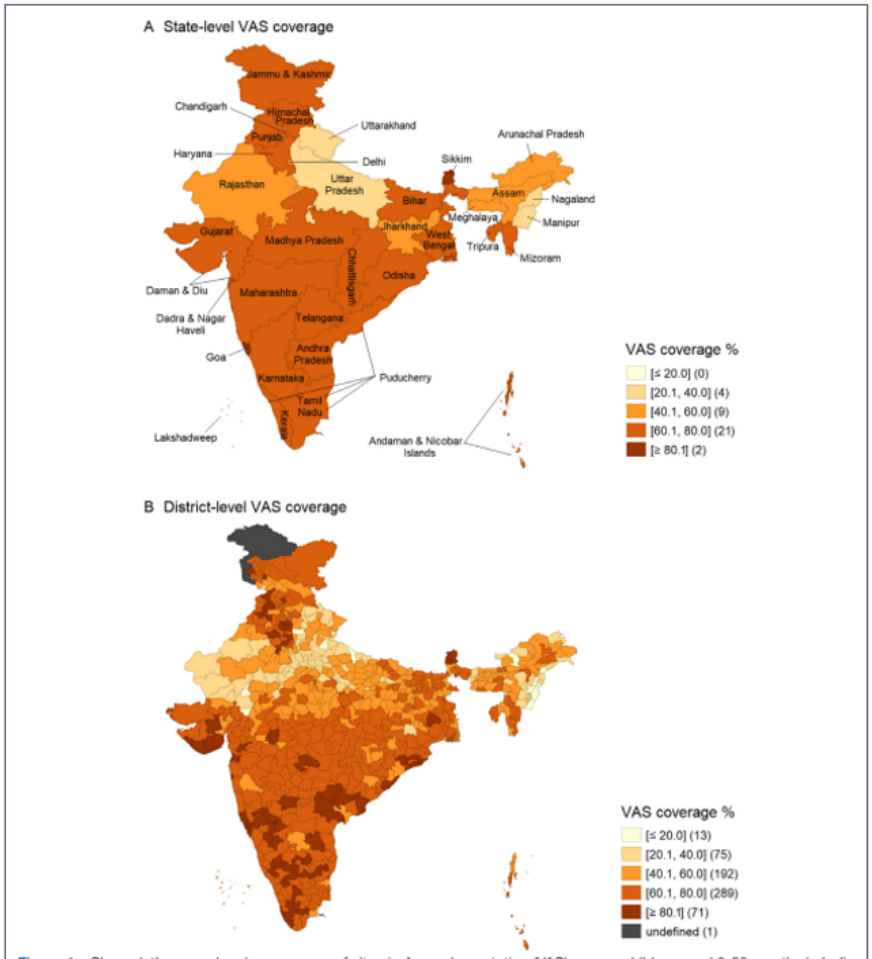


Figure 1 Choropleth maps showing coverage of vitamin A supplementation (VAS) among children aged 9-59 months in India, 2015–2016, across (A) states/union territories and (B) districts. (Values within square brackets in the colour legends indicate the specified VAS coverage range, and values within round brackets indicate the number of states/union territories or districts belonging to that coverage range.)

Figure 1. Choropleth maps showing coverage of vitamin A supplementation (VAS) among children aged 9-59 months in India, 2015–2016, across (A) states/union territories and (B) districts. (Values within square brackets in the colour legends indicate the specified VAS coverage range, and values within round brackets indicate the number of states/union territories or districts belonging to that coverage range.)

Bora K. Vitamin A supplementation among 9-59 month old children in India: geospatial perspectives and implications for targeted coverage. BMJ Global Health 2022;7:e007972. doi:10.1136/ bmjgh-2021-007972

Figure 19.3 shows an example of a table with a complete title, and columns that are clearly labeled. Each row variable in the table is precisely defined.

Figure 19.3. Example a Good Visual Element: Table

Table 2. Iron Supplement Adherence Levels (Frequency and Percent) Among 243 Thai Women With Anemia, 2024

Adherence level for iron supplements	Frequency	Percent
Poor (took < 50% of prescribed supplements in past month)	124	51%
Partial (took 50-90% of prescribed supplements in past month)	86	35%
Good (took >90% of prescribed supplements in past month)	33	14%

Common Pitfalls in Crafting Visual Elements and How to Avoid Them

Below, I offer a description of common pitfalls experienced in developing visual elements and solutions to help you avoid them.

PITFALL #1: Incomplete Figures and Tables

Description: Figures and tables are incomplete. For example, they are not understandable on their own without having to consult the text, or because they omit important information such as what statistical test was used to generate a *p* value, the units of measure, or the figure axes.

Solution: Include necessary details to help the reader understand the content of the figure or table and to accommodate readers who skip to the figures and tables without reading the results text. In practice, this means titling the figure or table with information

describing who (the participants), what (the information shown), when (dates when the data were collected), where (location where the data were collected), and how (in other words, information about the analytic approach used to generate the results); the example in Figure 19.2 includes all of these elements. Also, be sure to label the axes and include footnotes with abbreviations and information on statistical tests where relevant as well as including units of measure where relevant (again, see Figure 19.1).

PITFALL #2: Using a Table to Present Data That is Suitable for a Figure

Description: Presenting information in a table, which is not as visually engaging as a figure.

Solution: It is not always feasible to make a figure, but you should choose a figure to add interest and engagement for readers whenever possible. Figure 19.4 shows a makeover of the table shown in Figure 19.3. Figure 19.4 displays the same information as the example table, but it does not include percents–which readers can calculate if they wish. Darker red is used for the poor iron supplement adherence category because red is often associated with worse health status.

Figure 19.4. Figure Made From Data in the Table Shown in Figure 19.3

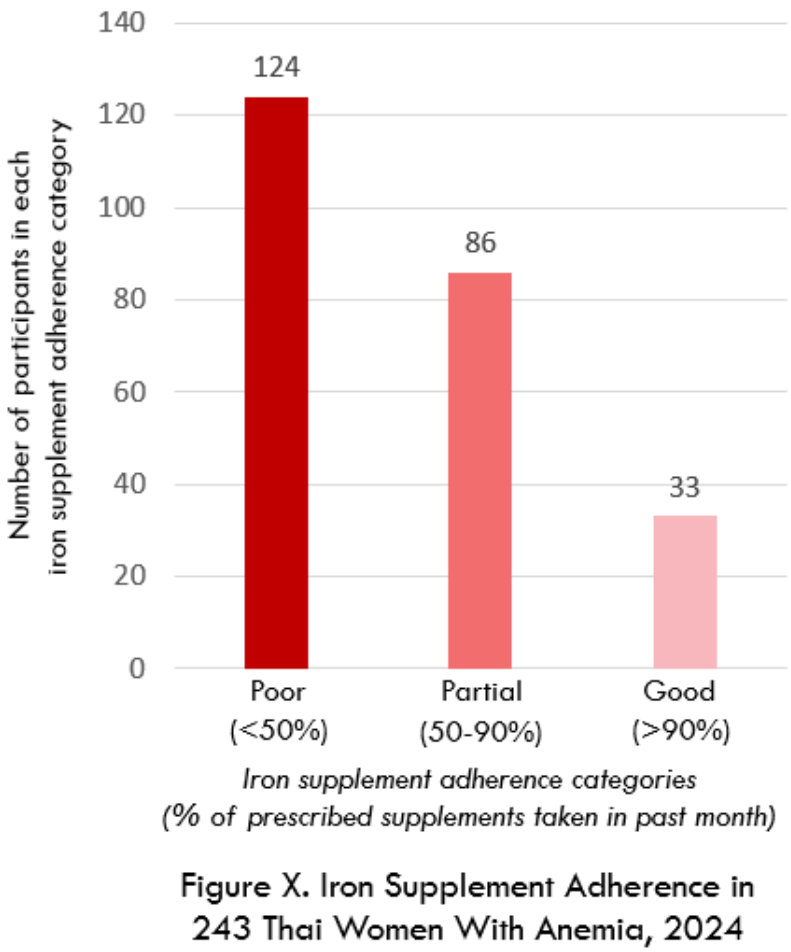


Figure X. Iron Supplement Adherence in 243 Thai Women With Anemia, 2024

PITFALL #3: Presenting Data Not Directly Tied to Objectives

Description: Presenting bulky data that does not focus on your key objectives. For example, including a table with extensive descriptive data that is not directly relevant to your research objectives.

Solution: Be judicious about what information you include to help the reader focus on what is most important.

PITFALL #4: Unsuitable Color Scheme for Black and White Presentation

Description: Using a color scheme that does not work in black and white. We often design our visual elements in color in a software application such as Excel, but choosing colors that look good in Excel may not work for readers who view or print documents in black and white, as even different colored bars may not be visually distinguishable in that color scheme.

Solution: Design your visuals to be effective in black and white. To check the accessibility of your visual elements, simply view or print the figures in grayscale. Figure 19.5a shows a figure using three colors without enough contrast for effective display in black and white (see Figure 19.5b for a black and white version of Figure 19.5a; note the colored bars are not distinguishable).

Figure 19.5a. Color Figure Featuring Colors Without Enough Contrast

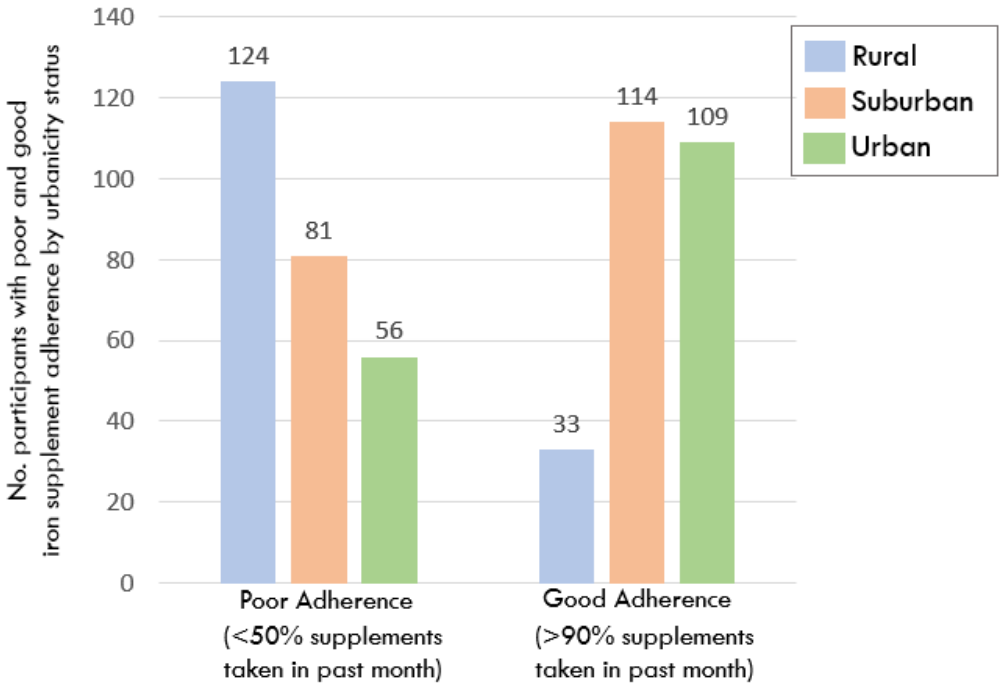
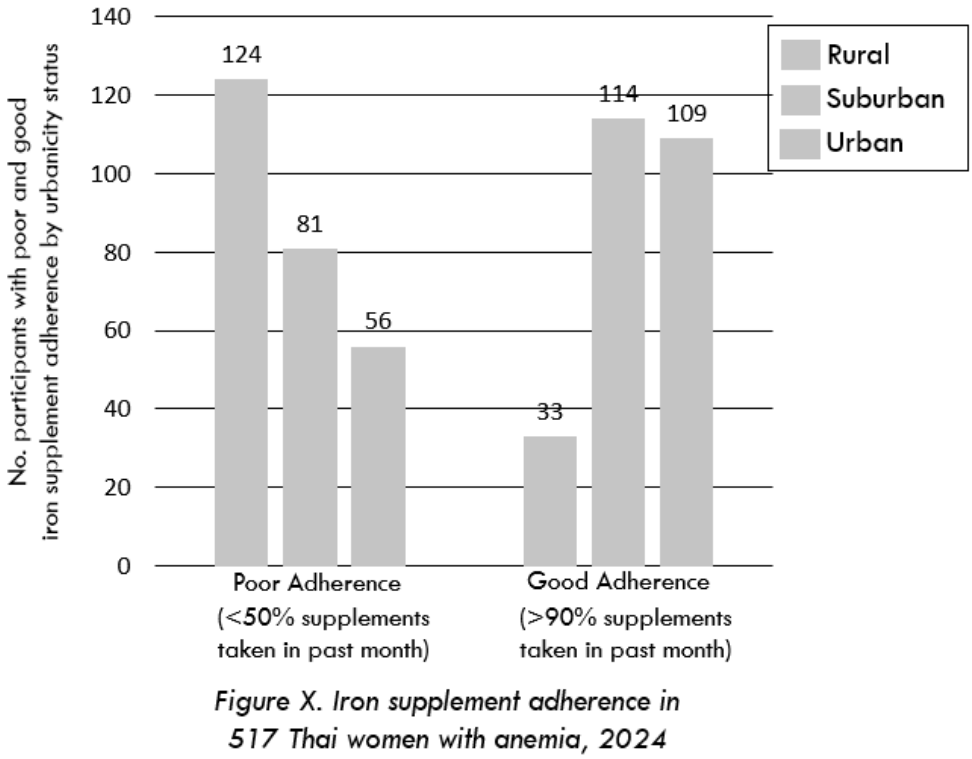


Figure X. Iron supplement adherence in 517 Thai women with anemia, 2024

Figure 19.5b. Black and White Version of Figure 19.5a, Demonstrating the Lack of Contrast



PITFALL #5: Design That Is Not Colorblind Friendly

Description: Using a design that is not colorblind-friendly. Approximately 8% of males have some form of color blindness,[473] and certain combinations of colors are not distinguishable for these individuals; for example, certain combinations of red and green and/or color combinations without enough contrast.

Solution: Design your visuals to be color-blind friendly by avoiding red-green combinations and using plenty of contrast: more information and color-blind friendly color palettes can be found using the end-of-chapter resources.

Figure 19.6a. Color Figure With Red and Green Colors That Do Not Have Enough Contrast

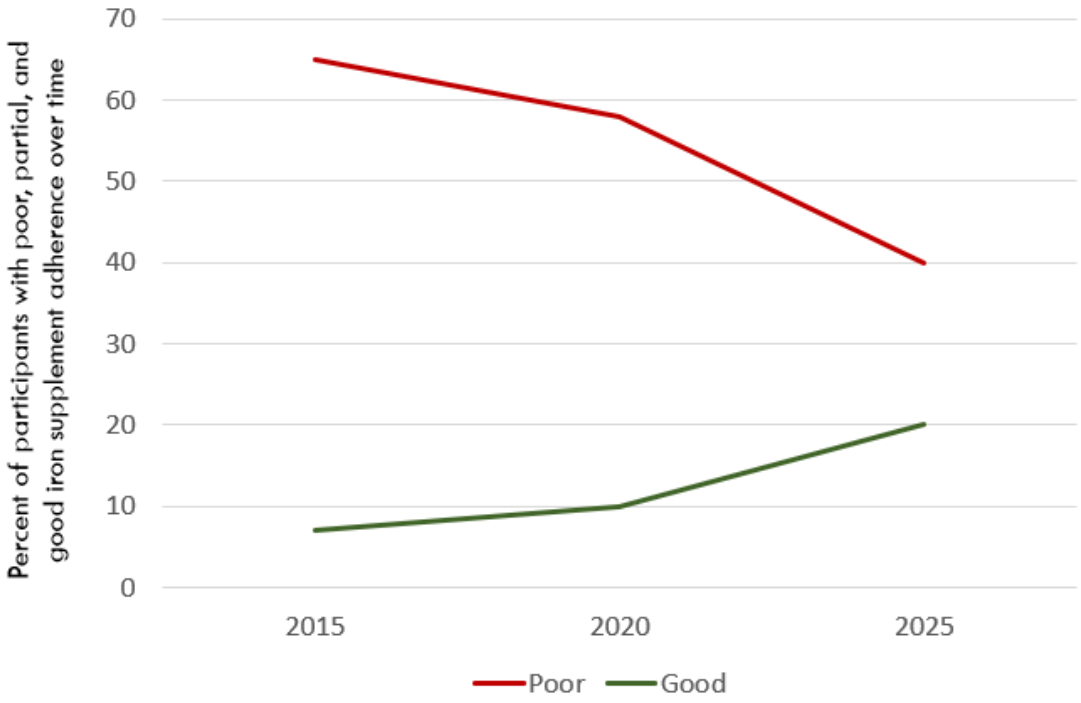


Figure X. Iron supplement adherence over time in a sample of 892 Thai women with anemia, 2024

Figure 19.6b. Figure Showing How Some With Color Blindness See Figure 19.6a

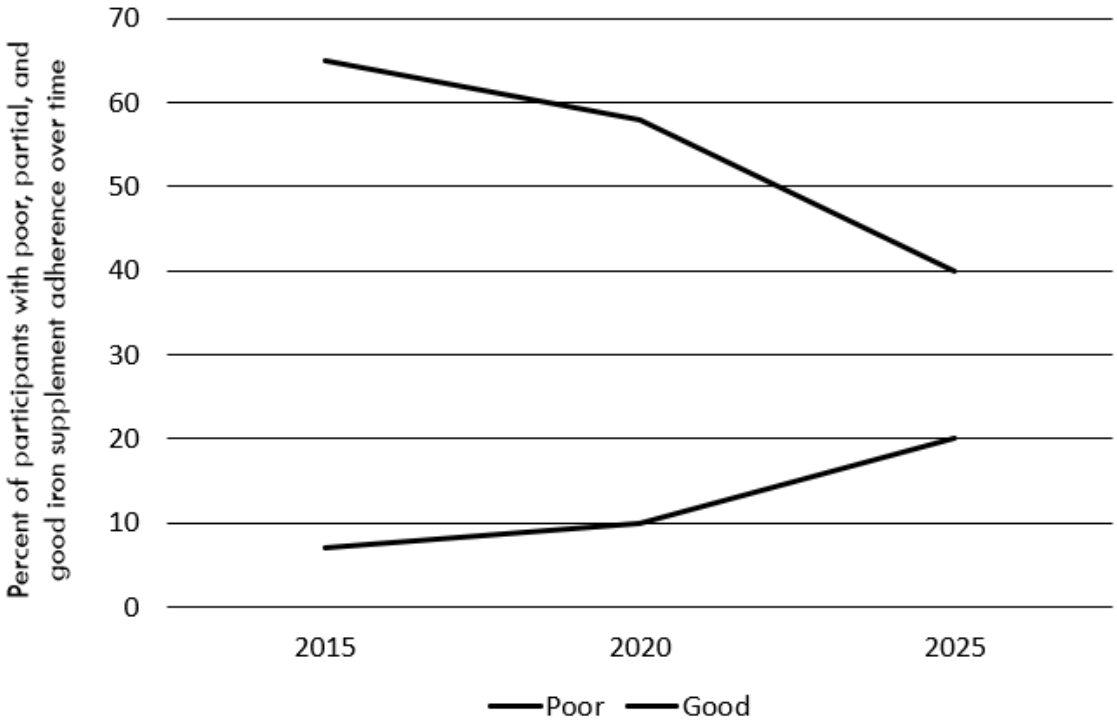


Figure X. Iron supplement adherence over time in a sample of 892 Thai women with anemia, 2024

PITFALL #6: Busy Color Scheme

Description: Busy color schemes that do not show patterns in the data easily.

Solution: Use color and contrast appropriately, presenting progressively darker colors as progressively higher or greater, as this is how we intuitively tend to interpret such a color scheme. See the choropleth map in Figure 19.2 as a good example of this type of progressive color scheme.

PITFALL #7: Inconsistent Color Scheme

Description: Using a color scheme that is not consistent throughout your paper.

Solution: Use a consistent color scheme throughout the visual elements in your document. For example, if women are shown with green bars or lines in one figure, they should also be represented with green in your other figures.

PITFALL #8: Failure to Secure Permission For Photos

Description: Using photos or other visual elements without permission from the creator of that visual or using a photograph of your own without permission from the people in the photo.

Solution: If you are using a visual you did not create, secure permission if applicable. If you include photographs, be sure you have permission from the people in the photo for the purpose of publication.

PITFALL #9: Failure to Provide Context For Data

Description: Reporting information that your readers will not be able to interpret without explanation, such as income level in a local currency like the Ethiopian birr for a non-local journal without interpretation.

Solution: Provide enough explanation for your readers to understand your results. For example, if you are publishing in an international journal, add interpretations to income level groups such as: "Annual income <7,200 Ethiopian Birr (below poverty)."

PITFALL #10: Inappropriate Use of 3-Dimensional Figures

Description: Using a 3-dimensional figure (such as a pie chart or figure) to portray something that is not 3-dimensional in real life. Figure 19.7a shows one example of why 3-dimensional figures can be problematic. In the figure, 64% of participants fall into the "1-3 per month" category; however, the stacked edge of that lower pie slice makes it seem proportionately larger than 64% of the pie.

Solution: Use a flat, 2-dimensional figure unless you are portraying something that is actually 3-dimensional. Figure 19.7b shows a revised pie chart that is 2-dimensional where each pie slice in is equivalent and the proportions are correct and easy to visually interpret.

Figure 19.7a. Three-Dimensional Pie Chart That Distorts the Visual Representation of the Proportions

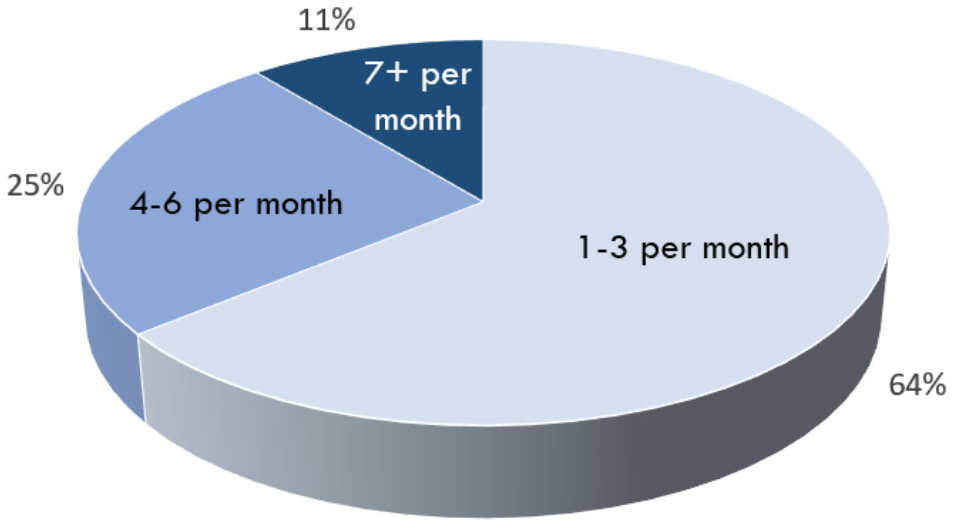


Figure X. Proportion of Children Who Experience 1-3, 4-6, or 7+ Migraines Per Month in a Sample of 1685 Children Who Regularly Experience Migraines, United States, 2025.

Figure 19.7b. Two-Dimensional Pie Chart That Does Not Distort the Visual Representation of the Proportions

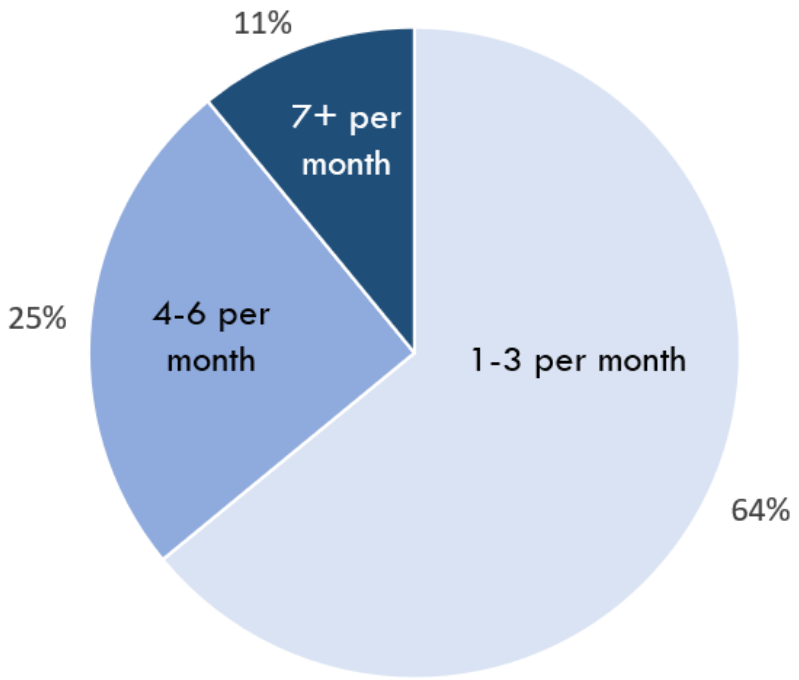


Figure X. Proportion of Children Who Experience 1-3, 4-6, or 7+ Migraines Per Month in a Sample of 1685 Children Who Regularly Experience Migraines, United States, 2025.

Related Open-Access Resources

- Free, online resources such as AuthorAID, PATH, and Colorbrewer provide a range of resources related to data visualization.

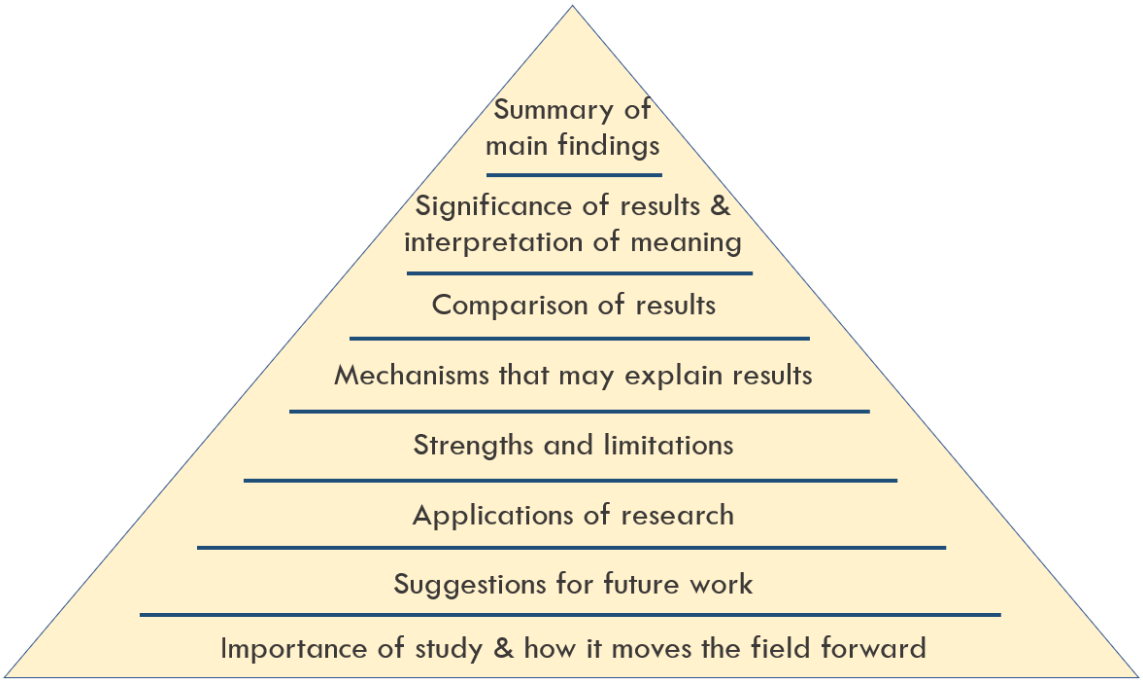
Chapter 20: Interpreting and Contextualizing Your Findings With a Discussion

Purpose of the Discussion Section

The purpose of the discussion section is to provide a context in which to understand your results.[470,474] Key elements that help you achieve this goal include an interpretation of your results and a description of the study limitations.[466] Another goal of the discussion is to help readers place your study into the broader literature.[470,474] Finally, this section should further contextualize your study by suggesting applications of your work, as well as future work to expand and extend your research.

The "shape" of the discussion is a mirror image of the introduction section. It should take the form of a right-side-up triangle beginning with a focus on your study, broadening to discuss the literature and, finally, future work.[431] Each component is briefly described in Figure 20.1.

Figure 20.1. Discussion Section: Overview of Standard Arguments and Structure[431]



Typically, the discussion begins with a high-level summary of the main findings.[466] In this part, it is a good idea to stay focused on the main findings and avoid details such as statistical test results and *p* values. Early on in your discussion, you should interpret the meaning of your findings and explain why they are important, as well as provide the reader with a sense of how your study fits into the broader literature by comparing your results with other studies. Do your results agree or disagree with other studies? If your findings are different, explain why you think they are different.[133]

Further, your discussion should describe biological, social, or other pathways or mechanisms that might give rise to, or explain, the results. For example, if your study shows that depression in pregnancy is associated with low birth weight, you should explain the mechanism that you think is at play (for example, it could be that depressed mothers do not eat enough, thus providing inadequate nutrition for their developing baby). However, if the pathways driving the identified associations are not clear, this can then be a point of discussion.

Every study has strengths: describe yours, starting with your most impressive strength.[470] If you are having trouble identifying strengths, read examples of similar studies to get ideas flowing. Additionally, every study has limitations—articulate yours to provide a context for readers to interpret your findings.[466,470] Provide insight on how each limitation may have impacted your results, where applicable, but defend limitations that are unlikely to have had a big impact on your results. While some study limitations have a major impact on your results, others are unlikely to have made a big impact. For the latter type of limitations, one approach is an "acknowledge and defend" strategy to soften how they land with your readers.

In this approach, a writer first presents or "acknowledges" their study limitation, and immediately afterward, they defend or counterbalance the limitation.[474] Where appropriate, a reason can be provided as to why the limitation might not be a big problem. Alternatively, actions taken to minimize the limitation's impact on your results can be described. For example, a researcher might implement this strategy: "Because colon cancer causes patients to lose weight, underestimating the body mass index of our participants would be a problem if our measurement did not reflect a pre-cancer body weight. An underestimation of body weight would have caused us to underestimate the association between colon cancer and BMI. To minimize this problem, we asked participants to report their pre-cancer body weight."

Where appropriate, suggest applications of your research.[431] These applications should be tailored to the core readership of the journal, which you have chosen in part to reach those who can do something with your findings. For example, if the journal's core readership includes policy makers, then policy recommendations will be valuable. If the results have a clinical application, then describe these to the nurses, doctors, midwives, physical therapists, or other healthcare providers reading the journal. Another suggestion you can make in your discussion is specific recommendations for future study, as these can build on your study to further extend the scope of the topic. If you have a next step planned, this is a good place to argue that this research is needed. Finally, craft a concluding paragraph that recaps the importance of your results and how your study moves the field forward.

Typically, present tense is used in the discussion because you are describing your interpretation of the results and the current state of knowledge in your topic area.

Occasionally, authors will use the past tense to describe specific examples of research and then switch to present tense to make generalizations about the research.

In the next section, an annotated example of a published discussion section is presented. The example in Figure 20.2 shows how the standard arguments and structure appear in a high-quality publication.

Figure 20.2. Annotated Example of a Discussion Section. The Article[114] Is Shown on the Left. Annotations Are on the Right in Boxes: Standard Arguments Are Shown in Yellow Boxes and Style, Story, and Other Features Are Shown in Clear Boxes.

DISCUSSION

We assessed the acceptability of HPV self-collection as an alternative to screening by using Pap smears or VIA in an indigenous community in Latin America. We found that self-collection kits had high acceptability and were preferred to physician screenings; a majority of women found the test kit comfortable and easy to use. We found a 17.4% prevalence of high-risk HPV, which is consistent with previous studies reporting a 16.1% prevalence for Latin America.[43] We also investigated risk factors for HPV infection and previous Pap smears or VIAs, associations that became statistically nonsignificant after adjustment for other covariates. This could be the result of inconsistencies with self-reporting or perhaps because their partner's sexual history (which was not assessed) might be a stronger determinant of HPV risk in this community.

This study was intended to serve as a first step to determine the potential of HPV screening in indigenous populations and also to provide baseline data for future longitudinal studies assessing the efficacy of HPV testing versus other screening modalities. Perhaps the most relevant finding is the high acceptability of self-collection and the willingness of the participants to engage in the study. In fact, 95% of participants completed the survey, 93% were interested in collecting self-samples, and more than 90% called to receive their results, numbers higher than expected. The study was very well received in the community, with strong support from local and health authorities, suggesting the potential to eventually implement HPV screening programs in this and other similar settings.

Significance of results and interpret meaning
In addition to appealing to the readers about why they did the research, the second paragraph serves to characterize the significance of their results and why they are meaningful.

Summarize main findings
The authors begin with a recap of their most exciting main finding but avoid going into details which are provided in the results.

Use active writing
Passive writing does not make clear who is performing an action. Because active writing provides more information, it is easier to understand. It is also a more lively and engaging way to connect with your readers, helping writers create a story. Through referring to themselves in the text via the pronoun "we," the authors make the text active and feel like a story with their team as the storyteller.

Sensory language
Sensory language paints a picture of a story's background and action. This language describes sights, sounds, smells, tastes, touch, and/or feelings associated with any aspect of a study. The description of the women's experience of comfort and ease of use is an example of sensory language.

Compare results
The text points out that their estimate of HPV prevalence in Guatemala is similar to the prevalence in Latin America. This suggests that their study's estimates are close to those in the broader region. Because the estimates of HPV are similar, their study may be generalizable to the broader Latin American population.

Summarize additional findings
In the last part of the first paragraph, results from the additional two research objectives (which did not identify significant associations) are presented. These are followed by speculation about why these associations were not present. These speculations are specific and plausible, and neither reflect poorly on the way the study was conducted.

Appeal to your readers about why you did the research
Explaining to your readers why you are telling the story or recommending a specific action appeals to your readers because it provides a concrete purpose and/or application. The second paragraph explains how this study will be useful in practice and how it can be extended in next steps. It highlights the responsiveness and interest of the study participants and that the investigation was well received in the community. This also builds the credibility of the author team as researchers who are connected to–and who care–about the community they are studying.

Strengths of the study include the multiclustered community design, which allowed us to obtain a representative sample of the population, provided an opportunity for participants to try self-collection in their homes rather than at a clinic, and allowed local CHWs to perform recruitment and interviews. Because of the latter, interviews were conducted in the participants' native language, potentially making them more comfortable answering sensitive questions. In addition, data were collected electronically, which eliminated the risk of errors from manual data entry. However, there are also important limitations. Given the cross-sectional design, participants might have misreported their history of screening and other risk factors, especially if there had been community educational programs or interventions that suggested that women should be screened for CC. Women may not have accurately remembered whether they had previously had a Pap smear or VIA (recall bias) or may not even be aware of whether these procedures had been performed on them. Another limitation is that we were unable to assess whether HPV-positive women followed up on their results. This is the topic of our current work in multiple communities in Guatemala with a new study population that will be followed up after 6 months and 1 year.

In addition, this community has been exposed to prior health interventions and studies from multiple institutions.[44-46] Although these studies did not specifically discuss HPV and CC, the exposure to health interventions could be reflected in the women's knowledge of health issues and their willingness to try self-collection. In the future, it will be important to assess the acceptability of these tests in other indigenous communities with less exposure to studies and interventions.

Strengths

The authors begin the paragraph with their study strengths and include the word "strengths" as the first word. This approach helps readers easily find the study's strengths and draws attention to them.

Limitations

The authors are forthcoming about their limitations, but some are followed by a statement that softens their impact. Acknowledging the limitations is a way of anticipating and acknowledging reader critiques, but softening the impact is a type of counterargument. For example, the research team was unable to assess whether HPV-positive women followed up on their results, but they are currently investigating this question and it is therefore being addressed. The authors note that the exposure to other health interventions may have impacted the women's knowledge and willingness to try self-collection. This acknowledgment is followed up with a statement that women without such exposure should be evaluated. This gives a future step to extend the research question and provides the sense that this limitation can be addressed.

Suggestions for future work

As described above, suggestions for future work are offered here. Note that rather than saying "more research is needed," which is not terribly informative, the authors provide specific suggestions that address the limitations of their study.

Conjunctions

Include conjunctions to provide signposts to guide the reader and enhance flow. Conjunctions connect words and phrases, helping to guide the reader and keep track of the story. "In addition" is used to connect this paragraph to the previous paragraph.

The study results are consistent with those of previous studies conducted in Asia and Africa on the acceptability of self-screening for HPV.[25,27,29] However, to the best of our knowledge, this is the first study to assess self-collection in indigenous populations in Latin America. This is also one of the first studies to provide an opportunity for participants to collect a sample in a community setting rather than simply sharing their feelings toward self-collection or collecting at a clinic.

This work assessed the acceptability of HPV self-screening in one community in Guatemala. Guatemala is a country with 23 languages and even more distinct communities, so our findings cannot be generalized to the whole population. It will be important to attempt to replicate the study in other parts of Guatemala and Latin America. Although it does seem that HPV self-collection screening could be a useful alternative to Pap smear or VIAs in these settings, this information alone does not allow us to make any determinations about whether this method of screening will reduce CC rates in developing countries. Women who tested positive for HPV should follow up with a doctor to receive Pap smears or VIAs or treatment. Hence, a logical next step would be to conduct longitudinal studies that compare rates of follow-up care among women who have tested positive with rates for those who have not been screened for HPV, as well as head-to-head comparisons between HPV-based versus Pap smear and VIA screening programs.[47] It is also important to continue developing new affordable and easy-to-use tests that could readily be implemented in low-income settings.[20-22]

The Ministry of Health in Guatemala is in the process of refining the National Cervical Cancer Prevention and Control program.[48] Following Pan-American Health Organization and WHO guidelines, the ministry has compiled a list of screening programs, some including HPV testing, that could be adopted. It will be the responsibility of each province (department) to determine which program best fits their needs and resources. We hope that our study, along with future evidence,[49] will help local and regional authorities identify the best CC screening alternative for their own settings.

Compare results

The limitations are immediately followed by a statement that the study results are similar to those in other regions, but that they are the first to examine the question in Latin America. This both suggest that the results *could* be generalizable (though they do say that they cannot claim the results are generalizable later in the discussion) and highlights the novelty of their research.

Connective words

"This work" connects to the previous paragraph, which ended with a discussion of their study.

Appeal to your readers about why you did the research

Explaining to your readers why you are telling the story or recommending a specific action appeals to your readers because it provides a concrete purpose and/or application. The authors remain focused on the potential utility of this research for Guatemalan women throughout the discussion.

Mechanisms: explain results

The authors explicitly make the link between the use of the self-swab kit and preventing cervical cancer in low-income settings here and throughout the discussion. The setting is part of this discussion because the research is very specific to the setting.

Suggestions for future work

The authors provide additional suggestions for future work. Again, these suggestions are specific and based on what they learned in this study.

Applications of research

The applications of this research are made concrete in this paragraph, discussing the policy implications of this work.

Importance of study and how it moves the field forward

The authors wrap up by expressing the potential for the study to inform action about cervical cancer screening in the region.

Common Discussion Section Pitfalls and How to Avoid Them

Below, I offer a list of common pitfalls writers face in crafting their discussion sections and solutions to help avoid them

PITFALL #1: Overinterpretation of Associations

Description: Overinterpreting or overstating associations; for example, interpreting an association from a cross-sectional study as causal with a statement such as: "Our study showed that consuming a greater number of alcoholic drinks per day significantly <u>impacted</u> blood pressure." (Note: Underlining was added as emphasis for clarification here in the example; it would not be included in the actual text. Watch for this convention moving forward in the following examples.)

Solution: Use words like "associated" or "related" as appropriate. For example: "Consuming a greater number of alcoholic drinks per day was significantly <u>associated</u> with higher blood pressure." Additionally, verbs such as "suggest," "show," "indicate," and "demonstrate" make your argument about what your data suggest.[4] Also use qualifiers, such as "possibly," "probably," "likely," "certainly," "could be," to convey the appropriate amount of certainty.[146]

PITFALL #2: New Results in the Discussion

Description: Presenting new results in the discussion section.

Solution: Avoid presenting new results in the discussion and instead focus on the elements shown in the right-side-up graphic at the beginning of this chapter.

PITFALL #3: Repeating Results Information in the Discussion

Description: Re-presenting detailed results in the discussion.

Solution: Avoid re-presenting detailed results in the discussion section. Instead, focus on the big picture when recapping results, emphasizing the nature of your findings and patterns in the data. A good guiding rule is to avoid mentioning statistical test results or *p* values and avoid referring to specific data or statistical test results in tables or figures.

PITFALL #4: Failure to Review Current Literature

Description: Failing to re-review the literature between the time of initial drafting and publication. It can sometimes take up to 1 or 2 years to bring a paper to publication. Failure to re-review the literature during manuscript preparation and the review process can lead to missing an important new study that should be discussed in your paper.

Solution: Review the literature and consider including new studies right up until your paper goes to press.

PITFALL #5: Surface Level Study Limitations

Description: Providing surface level or generic limitations without considering or expressing how they may have impacted your results, such as: "We may have underestimated participants' BMI."

Solution: The purpose of explaining your study's limitations is to help your readers understand how to interpret the results. Of course, it's not always possible to know what impact your limitations might have on your results, but where possible be specific about how your study limitations may have impacted your results. This example shows how being specific about how you think limitations could have impacted your results provides a context for interpreting your study findings: "Because we used a survey to collect data, we measured body weight and height via self-report. Participants tend to

underestimate their weight and overestimate their height (citation needed here) on surveys. Any underestimation of BMI in our study would have caused us to underestimate the association between BMI and breast cancer risk. Therefore, our estimates of this association may be greater than those presented in the results." Explaining the impact of limitations also adds credibility to your author team because it shows that you are thinking deeply about your analysis and the validity of your findings.

PITFALL #6: Generic Recommendations For Future Studies

Description: Making the generic statement: "more studies are needed." This statement is so general that it does not actually have much meaning.

Solution: Offer a specific suggestion for future studies that will extend and expand your work; for example: "Hence, a logical next step would be to conduct a prospective study that tracks people's body weight and their development of breast cancer in real time to eliminate bias in the measurement of body weight."

PITFALL #7: Overly Ambitious Applications of Findings

Description: Suggesting applications of your research that are too ambitious. For example, if you are discussing your cross-sectional study or study results without a body of evidence consistent with your findings, you should not make clinical or policy recommendations; for example: "Because of the ability of the Galleri blood test to detect multiple types of cancer in our study, the United States government should invest in this technology and widely implement it in healthcare settings."

Solution: Provide suggested applications of your research appropriate to your study's design and the state of the literature. Remember the hierarchy of strength of evidence; for example, ecologic and cross-sectional studies can only identify correlations.

However, evidence for causal associations is much stronger in experimental designs such as randomized controlled trials. Additionally, consistent results across multiple studies are needed to draw conclusions about whether an association is causal. There are not always obvious clinical applications to discuss, and sometimes it is appropriate to describe next steps instead; for example: "The Galleri blood test may have potential to detect multiple types of cancer; however, this has only been shown in older men predisposed to prostate cancer. Additional studies should target older women."

Related Open-Access Resources

- Luby S, Southern DL. The pathway to publishing: A guide to quantitative writing in the health sciences. https://doi.org/10.1007/978-3-030-98175-4.
- Busse, C., August, E. How to Write and Publish a Research Paper for a Peer-Reviewed Journal. *J Canc Educ.* 2021; 36: 909–913. https://doi.org/10.1007/s13187-020-01751-z
- Mensh B, Kording K Ten simple rules for structuring papers. PLoS Comput Biol 2017;13(9): e1005619. https://doi.org/10.1371/journal.pcbi.1005619
- Zelner J, Broen K, August E. Backward paper writing for the data sciences. Patterns. 2022; 3(3). https://doi.org/10.1016/j.patter.2021.100423
- Equator Network is a website containing a collection of writing guidelines and checklists for different types of papers.
- Free, online platforms such as AuthorAID provide a range of scientific writing and publishing resources.
- The University of Manchester Academic Phrasebank provides example phrasing for language used in academic papers.

Chapter 21: Summarizing the Highlights With an Abstract

Your abstract should convince readers that your study is compelling enough to read the full paper.[466,470] It should capture the motivation, methods, results, and significance of the study.[466,470]

In the introduction or background section, describe the problem the research is meant to address and the context in which the study is situated.[475] Explain why the study is important and the research gap. While word counts can be restrictive, it is essential to provide enough background so that readers can understand the study.[470] The research objectives should be clearly stated at the end of the introduction or background section.[475]

In the methods, stay focused on the most important approaches used to evaluate your results,[475] avoiding details such as the name and version of your statistical software. The methods should provide enough information for readers to understand the results.

The results section should highlight 2-3 key findings and should include other important information such as the final sample size. You may choose to present data (e.g., point estimates) depending on your study type and the journal. Make sure that the methods used to estimate the presented results are described in the methods.[470]

In the final section (usually called the discussion or conclusion section), describe why your results are important and how your study moves the field forward.[475] If there is an obvious application, describe it here. You may also suggest a next step to extend the research.[475] It's a good idea to write or finalize the abstract after you have drafted the entire paper, so that you are drawing from what you wrote rather than what you anticipate writing.[274,476] Many abstracts are limited to 250 words, but check the author guidelines of your target journal for the maximum word count and stay within that word limit. You

should also avoid citing references in your abstract. Finally, be aware of your verb tenses while writing: objectives and background tend to be written in the present tense, the methods and results are often written in past tense, and the conclusions and implications are often written in the present tense.

Figure 21.1. Abstract: Overview of Standard Arguments and Structure. The Contents of a Structured Abstract Are the Same as an Unstructured Abstract.

Structured Abstract

Introduction: Describe the problem the research is meant to address and the context. Explain why the study is important and highlight the research gap. Provide enough background so that readers can understand the study. Define terms or concepts needed to understand the research.
Methods: Include key methods to help readers understand the study.
Results: Present 2-3 key findings. Create argument about patterns and support with data.
Conclusion: Describe why your results are important and how your study moves the field forward. If there is an obvious application, describe that here.

Unstructured Abstract

Describe the problem the research is meant to address and the context. Explain why the study is important and highlight the research gap. Provide enough background so that readers can understand the study. Define terms or concepts needed to understand the research. Include key methods to help readers understand the study. Present 2-3 key findings. Create argument about patterns and support with data. Describe why your results are important and how your study moves the field forward. If there is an obvious application, describe that here.

In the next section, I present an annotated example of a published abstract. The example shows how the standard arguments and structure appear in a high-quality publication.

Figure 21.2. Major Abstract Arguments and Elements: Annotated Example[114]

Purpose: Cervical cancer rates in Latin America are higher than those in developed countries, likely because of the lower prevalence of screening. Specifically, less than 40% of women in Guatemala are regularly screened and even fewer women are screened in indigenous communities. Current screening strategies—Pap smears and visual inspection with acetic acid—might not be the most effective methods for controlling cancer in these settings. We thus investigated the potential of self-collection of cervical samples with testing for human papillomavirus (HPV) to help prevent cervical cancer in an indigenous community in Guatemala.

Patients and Methods: A community representative random sample of 202 indigenous women aged 18 to 60 years residing in Santiago Atitlan, Guatemala, were surveyed to assess knowledge of and risk factors for HPV and cervical cancer. Women were then invited to self-collect a cervical sample using HerSwab collection kits to assess the prevalence of HPV and the acceptability of self-sampling.

Results: Of 202 women who completed the survey, 178 (89%) provided a self-sample. In all, 79% of these women found the test comfortable, 91% found the test easy to use, and 100% reported they were willing to perform the test periodically as a screening method. Thirty-one samples (17%) were positive for at least one of 13 high-risk HPV types, and eight (4.5%) were positive for HPV 16/18.

Conclusion: HPV testing by using self-collected samples was well accepted, suggesting that it is a plausible modality for cervical cancer screening in indigenous communities. Further studies are needed to assess rates of follow-up after a positive test and to determine whether these findings extend to other indigenous and nonindigenous communities in Guatemala and Latin America.

Purpose (sometimes called Introduction or Background)

The first two sentences describe the problem the research is meant to address: the high rates of cervical cancer in Latin America. The authors argue that these higher rates are due to a lower prevalence of screening in this region. They name the broader region instead of focusing only on Guatemala in their introductory sentence, suggesting that their research may have relevance beyond Guatemala to Latin America. They go on to argue why their research is important (cancer screening prevents cervical cancer), what is known (Pap smears and visual inspection with acetic acid are effective but not suited to the region of study). The research gap is thus identified: there are no effective methods that are suitable for the region. They describe their research objectives in the context of the setting and population (an Indigenous community in Guatemala).

Patients and Methods

This section includes only key methods to help readers understand the study. The setting and population are described, as well as the study design (a cross-sectional design is implied with the term "survey.") The two main data collection tools (the survey and the optional self-collection kit) are characterized in terms of their purpose (knowledge of and risk factors for HPV and cervical cancer and acceptability and prevalence of HPV, respectively). Because this study does not require complex methods, the statistical approach is not included. Additional unnecessary details such as the statistical software are not included.

Results

The number in their final sample number is presented along with their two most important findings. The authors lead with their most impressive finding.

Conclusion

The authors lead with an argument about why their results are important (the self-collection approach was well accepted). They interpret their findings by suggesting the self-collection kit is a plausible approach for cervical cancer screening in the region under study. They further argue that this kit has potential for application in their study population. The next steps are outlined, broadening again to Latin America.

Common Abstract Pitfalls and How to Avoid Them

Below, I offer a list of common pitfalls in writing an abstract and solutions to help you avoid them.

PITFALL #1: Including Unnecessary Details

Description: Including extraneous details like the name of the analysis software in the abstract methods.

Solution: Focus on important elements that tell the story of your research. Share why your research is important, key methods, and the main findings and implications.

PITFALL #2: Lack of Background

Description: Failing to explain the basic premise of the research or one that does not provide enough background to allow the reader to understand the research.

Solution: The abstract must be understandable on its own without having to refer to the main text. Be sure that your abstract emphasizes big-picture ideas such as why it is important and how it contributes to the broader literature.

PITFALL #3: Inconsistent Data

Description: The sample size or point estimates are not consistent in the abstract versus the main body of the paper.

Solution: Before you submit your paper to a journal, double-check that details in the abstract are consistent with the full text.

PITFALL #4: Excessive Jargon or Abbreviations

Description: Including jargon or excessive abbreviations. These are likely to make your abstract less understandable and therefore less inviting.

Solution: Avoid using jargon, excessive abbreviations in your abstract so that it is easy to understand and invites people to read the whole paper.

Related Open-Access Resources

- Mensh B, Kording K. Ten simple rules for structuring papers. PLoS Comput Biol 2017; 13(9): e1005619. https://doi.org/10.1371/journal.pcbi.1005619
- Equator Network is a website containing a collection of writing guidelines and checklists for different types of papers.
- Free, online platforms such as AuthorAID provide a range of scientific writing and publishing resources.
- The University of Manchester Academic Phrasebank provides example phrasing for language used in academic papers.

Chapter 22: Promoting Your Paper With a Clear and Inviting Title

Purpose of the Title

A title is a critical part of any publication.[270–272] After reviewing the title, readers decide whether to continue reading the rest of the document and an effective title may also boost citation frequency and impact.[270,271] Your title should be informative and interesting, describe the main story of your paper, and argue that your paper is worth reading.[435] It should also include obvious keywords that will bring your article up in a search.[435] It is a good idea to write or finalize your title after you have written your paper because the focus of your paper can change as you develop it.[274,431]

Three common types of article titles are: descriptive, declarative, and question titles.[271,477] Examples of each of these title types is shown in Figure 22.1. While any of these styles may fit your study, question titles may be more suitable for perspective, commentary, or opinion pieces than for research articles. Regardless of your title style, consider including the independent and dependent variables, the population and setting, the study design, and the timing as appropriate.[431] Be sure to check the author guidelines of your target journal as they may have specific requirements.

Figure 22.1. Title Arguments and Structure Overview and Examples

Descriptive (or Informative) Titles

Describes the subject or topic of the article.
Example: "Stroke survivors' mobility three years later: A cohort study of older American adults."

Declarative Titles

Describes the topic and states the main conclusion, or findings, of the study.
Example: "Most older American stroke survivors struggle with mobility impairments three years later: Results from a cohort study."

Question Titles

Example: "What mobility impairments exist in older American stroke survivors three years later?"

Common Title Pitfalls and How to Avoid Them

Below is a list of common title pitfalls and solutions to help you avoid them

PITFALL #1: Failure to Explain Important Context

Description: Titles that include names of cities and institutions that are not familiar to the journal's readership. For example, if the following paper were published in an international journal, readers would not understand the type of setting: "The benefits of birth companionship for women delivering babies in Tefera Hailu Memorial Hospital, Sekota Town, Ethiopia." Such titles have been associated with low citation frequency,[478] and this is likely because readers may not see the relevance of the study to their own settings.

Solution: Avoid including the name of an institution or city unfamiliar to your readership because readers may skip the article or fail to see the broader relevance. Instead, describe the setting in a way that the journal's readership can understand and identify with. For example, instead of naming a specific hospital, characterize it as a "large urban government hospital in Ethiopia" or a "small health clinic in a rural town in Ethiopia." For example: "Benefits of birth companionship for women delivering in public hospitals in rural Ethiopia."

PITFALL #2: Inappropriate Use of Causal Language

Description: Inappropriately using causal language. In this example, the study is observational, but the title suggests it is an experimental design: "Labor companions deliver: An observational study on how labor companionship can <u>improve</u> birth outcomes." (Note: Underlining was added as emphasis for clarification here in the

example; it would not be included in the actual text. Watch for this convention moving forward in the following examples.)

Solution: Use language appropriate to the study design and the strength of evidence shown in the broader literature. For example: "Labor companionship is associated with better birth outcomes in rural Ethiopia."

PITFALL #3: Uninformative Title

Description: Cute or amusing titles that are not informative. Papers with such titles were shown to not have any citation advantage.[479,480] This title is catchy, but does not describe or summarize the study: "Happy mothers, healthy babies." It is also not clear whether this study is an original research investigation or another type of publication such as a commentary.

Solution: Craft an informative title that helps the readers understand what the study is about, such as: "Labor companionship is associated with better birth outcomes in rural Ethiopia." Because the focus of the paper can change as you write and revise, I recommend you wait until you have finished writing your paper before composing the title.

PITFALL #4: Abbreviations in Title

Description: Avoid abbreviations in your title because readers unfamiliar with the abbreviations may skip over your paper. For example: "FP uptake is an important SRH priority among health extension workers in rural Ethiopia." Additionally, because a potential reader may not use abbreviations in a literature search, the paper could be missed.

Solution: Avoid uncommon abbreviations in your title and avoid unfamiliar jargon for the same reason. The goal is to make your title understandable to the broadest readership possible. "Family planning uptake is an important sexual and reproductive health priority among health extension workers in rural Ethiopia."

PITFALL #5: Bulky Title

Description: Including non-essential words in your title, such as: "The relationship between self-rated happiness and measured income level: A population-based study of 19,499 Canadian government workers." This title contains non-essential words that drain the energy from it.

Solution: Eliminate unnecessary words for a punchier title. The example below eliminates "the relationship between," which is not necessary; it also does not include "self-rated" and "measured," as they are details that can be described in the main paper: "Happiness and income level: A population-based study of 19,499 Canadian government workers."

PITFALL #6: Redundancy With Keywords

Description: Strategically coordinate your title and keywords to maximize your paper's discoverability. In this example, there is overlap between the title and keywords (*Keywords*: happiness, income level, Canada, surveys) which reduces the chance that a database search will identify the article: "Happiness and income level: A population-based study of 19,499 Canadian government workers."

Solution: Your title words should complement, rather than repeat, your keywords to maximize the likelihood that a researcher will find your paper through a database search. Use MESH (Medical Subject Headings) keywords where possible (Note:

sometimes journals require you to use their own non-MESH keywords). In this example, the title words and keywords (*Keywords:* mental health, emotions, economic status, burnout, psychological) do not overlap, maximizing the chance someone can find the article and MESH keywords are used: "Happiness and income level: A population-based study of 19,499 Canadian government workers."

PITFALL #7: Failure to Follow Journal Guidelines

Description: Writing a title that does not follow target journal guidelines. For example, some journals may have a length limit, forbid colons, forbid question titles, or have other rules in place.

Solution: Check your target journal author guidelines and ensure that your title meets the requirements.

Related Open-Access Resources

- Free, online platforms such as AuthorAID provide a range of scientific writing and publishing resources.

Chapter 23: Responding Effectively to Journal Peer Reviewers and Moving Toward Publication

Overview of the Peer Review Process

Submitting a paper to your target journal is a major accomplishment, and one that you should be proud of! However, there is typically more work to be done before your manuscript goes to press. After submission, there are two main phases of review: 1) initial editorial review and 2) peer review.

During initial editorial review, the editor assesses whether an article is suitable for the journal based on their stated mission. In this stage, the editor decides whether to reject your paper outright (referred to as a "desk rejection") or advance your paper to peer review. Factors that impact whether a paper is advanced at this stage include the fit with the journal, the novelty of the research presented, and the quality of the methods. In some top-tiered journals, only a small percentage of the submitted articles are advanced to peer review. For a paper to be acceptable for a general journal like *Science, Nature,* or *Proceedings of the National Academy of Sciences* (PNAS), it must have broad appeal. Papers submitted to narrower journals must appeal to that journal's readership.

If your paper advances to peer review, this means you have chosen a target journal that is potentially a good fit and have cleared the first hurdle of editorial review. The peer-review phase can include 2-3 rounds of review or more. In the initial peer review, 2-5 reviewers decide whether to reject your manuscript, accept your paper with no changes (a rare outcome), or request major or minor revisions.[366]

If your paper is not rejected after the initial round of peer review, you will have the opportunity to address the reviewers' comments (as well as comments from the editors, which may appear alongside the reviewers).[366] After reviewing your responses to their comments and the revised manuscript, reviewers will decide whether they are satisfied with your revision or if more changes are needed. At this stage, reviewers may alternatively decide that your revised manuscript is not acceptable and recommend that the editor reject it.[366] Your goal is to successfully navigate the peer-review process in a way that leads to acceptance for publication. However, if your paper is rejected after one or more rounds of peer review, it's important to remember that you likely received some helpful advice that improved your paper enough to help you in publishing at another journal.

Responding to Peer Reviewers Is Important

In addition to the fact that peer reviewers (alongside the editor) decide whether your paper will be accepted for publication, the peer-review process represents your last chance to improve your paper before it gets published.[481]

Look Carefully at Your Decision Email for Important Information

The editor may respond to your initial submission with an email conveying that your manuscript is not acceptable in its current form. Do not be discouraged if you receive an email like this. Instead, look closely at the entire correspondence to see if you are being given the opportunity to respond to reviewers' comments and revise your manuscript. It's important to check the revision due date. Submitting your paper after this date will likely result in a missed opportunity to submit a revision (if you still wanted to pursue publication in that journal, you would need to submit your manuscript as a new

submission instead). If your author team is unable to respond by the deadline for any reason, request an extension in advance of the deadline. One helpful approach is to wait until you are near the due date and ask for the number of extra weeks you think you need to complete the response to the reviewers. These types of requests are common and, in my experience, are often granted.

Organize the Work Among Your Coauthors

The corresponding author will receive the peer reviewer comments, and this individual will need to take the lead on organizing a response. The lead author may draft a response to peer reviewers and corresponding revisions or may assign different coauthors specific comments to address. Regardless how the work is organized, all coauthors should be aware of the reviewer comments and be given the opportunity to review the responses and any revisions that have been made prior to resubmission.[342]

Prioritize and Organize Your Work

If you are taking the lead on responding to reviewers, it's a good idea to start by reading through all the comments, fully considering each. If they are not already prioritized into major and minor suggestions, prioritize them. Address the major suggestions first, as these are the most important concerns. You may find that addressing these comments triggers other changes, and, in some cases, the minor comments will no longer apply.

How to Write an Effective Reviewer Response

Peer review is a voluntary activity in which experts share their time and expertise to help you improve your paper. Your response should reflect your gratitude for their service and respect for their expertise and perspectives.[366,481] Peer review is also a process

you must successfully navigate to publish your paper. The below advice will help you be responsive and respectful to your reviewers and to successfully reach publication.

Make It Easy for Reviewers to Navigate Your Response. Your response should make it as easy as possible for the reviewers to understand your answers to their questions, whether you agreed with their suggestions, and what was modified in your paper. Start with a brief note to reviewers thanking them for their comments and letting them know how your response is organized. An example is provided in the Box 23.1.

Box 23.1. Sample Introductory Text for a Response to Journal Peer Reviewers

Dear reviewers,

Thank you for the feedback on our paper. Below, we provide a point-by-point response to each of your comments. Where applicable, we include page and line numbers pointing to each change, and these correspond to the clean version of our revised paper.

Sincerely,

Juan Marquez on behalf of the author team

It is standard practice to include two versions of your revised document: one that shows changes marked through the "track changes" feature in your word processor or some other method, and a so-called "clean version" of the revised document in which all changes are accepted. As you can see, the brief note to reviewers refers them to page and line numbers on the clean version.

Be Responsive and Show Your Appreciation. Fully respond to every comment, including those you agree with and those you may disagree with.[366] Include a word of thanks as appropriate, explain whether you agree with the comment, describe what action was taken in response to the comment, and guide them to the actual change in your

manuscript. Always be constructive, respectful, and polite.[366] In the good example in Box 23.2, taken from a publicly available reviewer history of an article by Zachariasse et al.[482] published in BMJ Open, the authors respond with the three key components described above. First, they let the reviewer know they agree with their suggestion; second, the authors describe the change they made in the study settings and patient population paragraph of their methods; and third, they pasted their exact revised language addressing the specific change requested so the reviewer does not have to toggle back and forth between the manuscript and response to reviewers. Your responses don't need to be lengthy.

Box 23.2. Sample of a Good Response to a Journal Peer Reviewer

Reviewer Comment: "Also, assuming that the age subgroups include >12=adolescent based on page 12 line 53, but this is not explicitly stated."

Author Response: "We agree with the reviewer that it is not clearly stated that our study includes children as well as adolescents. We added to our methods section paragraph 'Study settings and patient population' a statement where we explicitly mention that our study includes adolescents as well: 'In the TrIAGE study, 119,209 consecutive ED visits of children and adolescents under the age of 16 years were included.' Furthermore, we have attempted to avoid using the word 'children' and used ED visits instead."

How to Handle a Comment You Do Not Understand

If you receive a comment that you don't understand, and you've asked your coauthors and they don't understand it either, you just need to say something along the lines of: "We would like to respond to your comment, but we need a bit more clarity." In

some cases, a reviewer comment might be somewhat unclear, but you think you know what they are getting at. In this case, you might respond and let them know that you were not certain, but you think they were suggesting X and then simply respond, but let the reviewer know you would be happy to revisit the comment if you misunderstood it.

How to Handle Comments That Contradict Each Other

Occasionally, you will receive comments or suggestions that contradict each other; for example, while one reviewer may suggest elaborating a statement in the discussion because they feel it is under-emphasized, another reviewer may suggest removing that statement claiming it is not necessary. It is up to your author team to decide what suggestions to act on and which to disagree with.[366] In this circumstance, you will need to disagree with one of the reviewers and I have included some suggestions about how to go about doing this below.

How to Handle a Comment That You Disagree With

Try to adhere to as many of the reviewers' suggestions as possible, even if you feel they are unnecessary. For example, if a reviewer requests you add information to the introduction or methods that you feel is not critical to your paper, but that you do not find objectionable, go ahead and make the change.[366] If a reviewer requests additional information that will add substantial length to your paper, consider including it as supplementary material. Sometimes a reviewer missed something in your paper; for example, they have asked you to add information that is already in your manuscript. In this case, it is possible that the information was not sufficiently emphasized. If the reviewer missed the information, a reader could also miss it. Here,

you might consider revising the text to better highlight the information, by including it in a separate paragraph with an informative header or with some other approach.

In some cases, a reviewer may suggest a change that you cannot make. For example, a reviewer may ask you to justify a methodological approach with a citation where no such citation exists. If it is not possible to implement such a suggestion, be honest in your response about why you are not able to correct the issue. In such a circumstance, you may respond by expanding the limitations to acknowledge an issue you were unable to rectify. Though you were unable to implement the reviewer's suggestion, you still responded to their concern.

In cases where you squarely disagree with a suggestion, it is acceptable to respectfully disagree with a reviewer.[366,481] However, respond in a way that shows you took the reviewer's comment seriously and provide carefully crafted arguments and evidence to justify why you disagree. I have shown a hypothetical example of this approach in Box 23.3. If possible, start by finding common ground; that is, identify a point on which you agree with the reviewer. Then go on to describe what you disagree with and why, while also including references where appropriate.

Box 23.3. Sample Text: How to Disagree With a Journal Peer Reviewer

Reviewer Comment: Table 3 is confusing because percentages are presented across category rather than within. Please revise the table. For example, the percent of children that have not been exposed to unclean drinking water should be 1621/3073=52%.

Author Response: Thank you for sharing this perspective. After carefully considering your suggestion, we have decided to retain the format of Table 3. We prefer to show

that 68.5% of children are not exposed to unclean water and 31.5% of children are exposed, rather than the proportion of non-exposed who were children versus young adults. In other words, each row adds to 100%, which we feel is easier for readers to comprehend. However, if the editor agrees with the reviewer suggestion to present the data by column rather than row, we will make this change.

Where appropriate, if there is a strong disagreement or you are struggling to find a resolution that is acceptable to a reviewer, you may convey that you will defer to the editor (as shown in the example above).

Take Advantage of Examples

Examples are helpful for all kinds of writing, and responses to reviewers are no exception. Publicly available peer-review histories that show every round of peer reviewer comments and author responses are available from journals with open peer review, such as BMJ Open. Take advantage of these examples when you are writing your first few responses to reviewers.

Related Open-Access Resources

- Journals such as BMJ Open provide open-access examples of journal peer reviews.

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