

Minding the (Gender) Gap: A Rhetorical Approach to Teaching STEMM Students about Citation Styles

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As a style, scientific writing prioritizes objectivity, concision, and precision. Consequently, scientific writing can appear innocuous, leading students and researchers to overlook practices that might contribute to gender-based biases and disparities,¹ particularly practices related to source selection and documentation. This is concerning when one considers the extent of underrepresentation of women and minorities in Science, Technology, Engineering, Math, and Medicine (STEMM)²—the fields most likely to require mastery of scientific style in order to succeed in the discipline. According to the National Science Foundation’s 2018 report *Women, Minorities, and Persons with Disabilities in Science and Engineering*, despite women achieving parity with men in degrees earned in many STEMM fields, women and minorities are still underemployed and underrepresented.

Research on writing centers and STEMM instruction has tended to focus on general ways to support science writers,³ the debate about whether to train tutors as generalists or specialists, and WAC and WID collaborations and programming. While it is essential to have this foundational knowledge when working with STEMM writers, it is also important to consider social and rhetorical aspects of scientific style, including the ways its seeming transparency can hide practices that contribute to gender disparities in STEMM disciplines. Teaching STEMM writers about the rhetorical dimensions of source selection and citing may not feel groundbreaking, but at the most basic level, it can be a starting point for facilitating important discussions about gender equity and representation in the sciences. The more tedious work of documenting sources in the sciences—the nuts and bolts of citation practice, such as where to place initials and dates, or which words to capitalize—is often classified as a lower-order concern by writers, instructors, and writing centers alike, or at least as something reserved for the final editing stage of the writing process. As many rhetoricians have pointed out, however, this tedious work has a rhetorical function, offering writers a point

of entry into an established discourse community with its own rules, values, and conventions.⁴ In this essay, I urge writing centers to take a rhetorical approach to teaching both source selection and documentation style as a way to address gender disparities in STEMM. I begin by linking documentation systems to gendered social norms and conclude by offering practical strategies for modifying consulting training and practice.

A RHETORICAL APPROACH: DOCUMENTATION STYLES AND GENDER BIAS

In one of the earliest essays linking documentation practices to social contexts, Robert Connors explains that “the seemingly ‘transparent’ structures used in formal citation systems have always been . . . products and reflections of social and rhetorical realities” (7). It is precisely the communal aspect of documentation styles that links the nuts and bolts of citing with social norms, and, as a result, makes it an area worthy of interrogation. Since sentence-level conventions so often serve as windows into larger social practices within a field, teaching writers to be aware of these conventions, how to deconstruct them, and perhaps, someday, how to revise or resist them, can be empowering. When students understand source selection and documentation as value-laden, they are positioned to better understand how these practices can contribute to social inequities within STEMM disciplines, especially those related to gender.

By raising awareness of implicit biases and potential pitfalls in source selection and documentation during writing consultations and workshops, STEMM writers can gain tools for becoming equitable contributors to their disciplines in the future. This is imperative, since gendered publishing and citation practices are reflective of inequitable social norms and have been found to play a major role in women’s underrepresentation and lack of career advancement. For example, a 2018 study of gender disparities in STEMM authorship found that 87 out of 115 STEMM disciplines examined had significantly less than 45% female authorship, even though all of the examined fields were at or close to achieving gender parity in terms of degrees conferred and employment (Holman et al.). Another study found that, between 1991 and 2011, men were 70% more likely to self-cite than women in STEMM publications (King et al.). While many factors contribute to gendered citation practices, several studies remark that gender socialization—particularly the idea that women are not as likely to self-promote their scholarship and are less likely to be promoted to senior levels that lead to prestigious author positions—plays a critical role (Holman et al.; King et al.; Wang and Degol). Significantly, since publications are

one of the main ways disciplines measure academic productivity and prestige, gender gaps can have a lasting negative impact on women's careers in STEMM, limiting their ability to receive promotions and credit for valuable research (Holman et al.).

Although the writers who use the writing center as undergraduates or graduate students may not be positioned to have an immediate impact on gender disparities in their disciplines, they can gain awareness of the gendered social norms governing publishing and citation practices in their fields, thereby taking a step toward becoming conscientious writers and critics in their respective fields as their careers progress. Many students, faculty, and disciplinary leaders might object to this kind of instruction, arguing that it detracts from objective source selection. While this is a valid concern, it may be a red herring, as students can be taught to select and cite sources objectively while also being mindful of gender biases and the need for equity within their disciplines. In a study of gender inequities in reporting, journalist Adrienne LaFrance asks an important question: "Is it your job to merely reflect what's out there, or do you have other reasons to write in a more representative fashion?" She answers her question by arguing that "we need to work harder to highlight a variety of voices, not just to improve gender diversity, but to make our stories better." Although LaFrance focuses on journalism, her questions are poignant in STEMM fields, where gender disparities are so prevalent. Not every consultation will allow for a focus on rhetorical approaches to source selection and documentation, and not every student or faculty member will be open to these conversations, but writing centers are positioned to begin the dialogue and equip writers with tools for equitable source documentation if and when they are ready to use them.

CONCRETE STRATEGIES: RHETORICAL APPROACHES TO SOURCE SELECTION

To have a positive impact on these gendered practices and patterns, writing consultants can be trained to open up discussions of gender disparities in STEMM publishing and to direct writers to places where they can find impactful and diverse voices in their field. It is already common practice to train consultants in helping writers find and evaluate sources. Rather than reinventing the wheel, directors can provide consultants with some open-ended, gender-related questions to include in these conversations. For example, consultants might ask writers, "have you ever considered gender when selecting your sources? Do you think a lot of women are represented in the research you do?" If writers seem open to these questions and the conversations they evoke, then consultants can take the lead in directing writers to resources to make their work

more gender-inclusive.

During consultations, one of the easiest ways to help writers work toward decreasing gender disparities in STEM publishing is to inform them about online directories and databases featuring women and minorities in STEM. While consulting time is often limited, it takes just a few minutes to mention that there are great directories for finding women's and minority voices if students are so inclined. One such resource is *Request a Woman Scientist*, a website created by the organization 500 Women Scientists. This site offers a directory of women scientists with a variety of expertise as well as a continually growing list of websites and databases focused on women and minorities in STEM disciplines. Consultants can also direct writers to discipline-specific resources, including, just to name a few, *DiversifyEEB*, a site dedicated to "highlighting ecologists and evolutionary biologists who are women and/or underrepresented minorities"; *Women Also Know Stuff*, a site offering a registry of female experts in behavioral research; *anneslist*, a blog that lists female neuroscientists and their expertise; the *Brookings Institute's SourceList*, which includes lists of female (and, in the future, minority) experts in technology; and the Women in Machine Learning's site, *Supporting Women in Machine Learning*, which provides a directory of women in the field. Introducing writers to directories of women scientists is a small act that needn't take a lot of time during consultations, and centers can make such lists even more accessible by linking them on their websites. Writing centers can also encourage students to begin their own lists of diverse experts by consulting with colleagues and reviewing existing research within their disciplines.

CONCRETE STRATEGIES: RHETORICAL APPROACHES TO SOURCE DOCUMENTATION

There are also many ways writing centers can encourage writers to consider how disciplinary values, including social attitudes about gender, shape the sentence-level rules of citation styles. On the WCenter listserv, Sue Mendelsohn has shared an activity I have used many times with great success that is designed to help students think critically about the rhetoric behind sentence-level details of citation style. The activity asks students to compare a journal article citation in various styles and to consider why disciplines organize and punctuate citations in their particular style. When I have used this activity in workshops, students easily pick up on the value systems embedded within these organizational and grammatical choices.

During group workshops or one-to-one consultations, writing center staff can hone in on the purpose and perhaps gendered

implications of specific stylistic requirements, such as the use of initial-only bibliographic citations in most STEMM documentation systems, to name one example. Most scientific citation systems use first initials rather than full first names (for example, AMA, APA, CSE), and almost all citation systems, including those used outside of the sciences, eliminate the names of some contributing authors altogether (for example, MLA). While initial-only citation systems have their roots in scientific style's commitment to concision and reflect the reality of multi-member research teams, they also have gendered implications. According to Jevin West et al., in the early- and mid-twentieth century, in addition to aiding in concision, initial-only systems discouraged gender discrimination in publishing during decades when women were entering the disciplines in larger numbers and facing discrimination. While the anonymity provided by STEMM citation styles might once have played a positive role, the same systems today may inadvertently contribute to biased authorship and research practices by obfuscating women and their contributions. It is easy to think that women are valued and active in STEMM research, or to assume their disinterest in such fields, if one cannot easily identify their names on a bibliography. "J. Smith" might refer to "Joe" or "Jennifer." Of course, writing centers must be cognizant of the limitations of this discussion, as many names are gender neutral or may not be indicative of gender to North American and Western European readers. And, while using full names may make it easier to identify women's participation (or lack thereof) in STEMM research, using full names could also still lead to gender bias in the publication process, as reviewers may be less likely to publish pieces if they see a woman's name attached, especially if the name is in a prominent author position.

Writing consultants are positioned to point out all of these possibilities during consultations and writing workshops so that students can understand the rhetorical and social implications of what many perceive to be arbitrary stylistic and grammatical details. I am not suggesting that writing centers push for changes in citation styles—the omission of full names and other citation practices that may come under observation serve a practical purpose in the sciences, and it is up to the discourse communities creating these systems to make changes. Instead, I am proposing that writing centers push students to think critically about the ways citation practices, whether intentionally or not, operate rhetorically and socially, and how they might impact gender equity in STEMM dependent upon different contexts. Students are not positioned to push back on these norms by altering citation styles, but by becoming more conscientious of the gendered implications of citation practices, they can become more deliberate about

inclusion and source selection in their own research if challenging the status quo is important to them.

In a similar vein, I often ask students to investigate the history of changes to documentation styles, looking specifically for the rationale behind the changes, in order to get them to see citation practices as rhetorical and socially constructed. This conversation often arises organically when students come in to the writing center frustrated that a documentation style has undergone another update and they must learn the new version. This is an ideal opening for conversations about the social and rhetorical dimensions of documenting sources. A timely and encouraging example is APA's recent publication of a 7th edition that addresses concerns related to gender through changes such as the allowance of the gender-inclusive, singular "they" (American Psychological Association 140). Historically-based exercises like these teach students that citation conventions are fluid and change over time; what was once useful in a discipline may no longer promote equity or the evolving goals of the field. As future contributors to their discipline, STEMM students can become more adept at understanding the connections between documentation styles and the relationships, values, and norms of their respective disciplines, thereby engaging critically in debates and shifts within their fields.

In sum, in order to facilitate greater consideration of gender equity in STEMM, writing centers can train their staff on the rhetorical dimensions of source selection and documentation. They can also develop more activities like those mentioned here that enable students to see the rhetorical components of citation styles. Citation styles are living, breathing systems that both reflect and shape the values of the fields that use them. By becoming more familiar with the rhetoric of STEMM citation styles, writing center practitioners can be better prepared to support writers to become responsible, informed researchers, readers, and writers in the scientific disciplines.

NOTES

1. Although this article limits its scope to discussions of gender equity due to page constraints, I believe rhetorical approaches to teaching citation systems should be intersectional, focusing not just on gender, but also on race, class, ability, and other identity markers that may contribute to inequities in STEMM publishing.

2. While the acronym STEM has been in use since the early 2000s, the addition of another "M," indicative of "Medicine," is relatively new. I use it in this article to reflect the growing number of students in the United States pursuing degrees and careers in medicine and the health sciences.

3. Dissertation boot camps and writing groups to reach STEMM writers are frequently discussed (Blake et al.; Lee and Golde; Gradin et al.). Sohui Lee and Russ Carpenter (2017) have argued for the use of the scientific research posters to teach

multimodal composing to students, including those in STEM programs. And scholars such as Amanda Greenwell (2017) and Beth Rapp Young (2001) have recommended rhetorical, disciplinary guides and heuristics to assist STEM writers.

4. Within the contexts of writing centers, specifically, see Susan Mueller, who advocates for a rhetorical approach to citing in the writing center in order to teach that documentation systems are not “an interchangeable hodge-podge,” but rather a way to align oneself with the work and values of a discipline (6).



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