



Engineering Students' Citation Skills: Instructor Perspectives and Educational Implications

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Abstract

This article addresses the oft-noted gap between the amount of instruction students have received and the citation knowledge they demonstrate once they reach discipline-specific courses. Focusing on engineering, where this gap appears most prominently at the institution where this study takes place, this article explores the expectations of engineering instructors regarding undergraduate students' knowledge and skills related to citation practices. In a survey about their experience with undergraduate students in Oregon State University's College of Engineering, the majority of engineering instructors indicated that both upper- and lower-division students were missing some key citation skills at both the general and disciplinary levels. In addition, engineering instructors believe that writing instructors should teach general citation practices, while engineering instructors should handle discipline-specific citations. The results of the survey affirm the importance of teaching for transfer when preparing students to translate general citation skills into a new discipline. The study highlights the need for adaptable citation instruction and suggests that further research is needed to assess citation education across various educational levels and institutions.

Keywords: Engineering, Citation, Information literacy, Writing

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Introduction

As university educators, we frequently hear students' frustrations about receiving repeated or inapplicable citation instruction from various instructors, juxtaposed with instructor concerns over students' insufficient citation knowledge. This paradox led us, a team composed of three librarians and the Director of Writing at Oregon State University (OSU), to begin research to better understand this gap. Initially, our focus was on examining student citation practices. However, we soon realized that a comprehensive understanding required us first to explore instructor perspectives. Therefore, we decided to investigate what instructors expect students to know about citation practices when entering their classes. To narrow our scope, we selected the Engineering College within our university, aiming to gather insights from professors and instructors regarding their expectations and beliefs about undergraduate citation practices.

Citation practices lay at the heart of academic research across disciplines. Still, given the wide variety of citation formats, disciplinary conventions, and rhetorical approaches to attributing scholarly work, there is little consistency in teaching citation practices in higher education or K-12 settings. At an institution like Oregon State University, students learning about citation practices in their writing classes will go on to conduct research in one of the 200-plus majors offered at the university, making it difficult to teach one stable set of practices that will capture every situation in which students will

need to cite others' ideas. This means that while students have had some practice with citations by the time they reach their major, it may have been in a different format or driven by different disciplinary expectations. Thus, they may need to learn or re-learn these practices when they enter a new research context that requires them to adopt a new style.

This potential gap in citation practices feels especially prominent when preparing engineering students to enter their fields; OSU houses almost 30 graduate and undergraduate programs in engineering, many of which have unique approaches to citations ([College of Engineering, 2025](#)). Engineering students are required to take a technical writing course that provides instruction on IEEE (see the "[Institutional Context](#)" section for more detail), but even so, the authors have noticed a disconnect between what engineering faculty believe their students should know about citations, and what citation skills engineering students actually possess when they arrive in engineering classes. The scholarly literature suggests that recent graduates arriving in engineering careers have difficulty translating their citation skills into the workplace, often because technical industries demand continual updating of citation knowledge to keep up with developments in the field ([Head, 2012](#); [Phillips et al., 2019](#)). Given the existing gap, we wanted to explore whether a similar gap in the ability to adapt to new citation skills exists at the college level, and to what extent engineering faculty feel that their students arrive with adequate information literacy skills.

Our study seeks to explore two key questions: What do engineering instructors want undergraduate students to know about citation practices? Who do they believe should be responsible for teaching these practices—high school teachers, librarians, engineering instructors, or writing instructors? By addressing these questions, we hope to begin bridging the gap between students' skills and instructor expectations.

Literature Review

Existing research on engineering students' citation practices focuses primarily on students' perceptions and usage of citations rather than on instructor and faculty expectations regarding what students should know and where they should gain that knowledge ([Blicblau et al., 2016](#); [Gadd et al., 2010](#); [Smyser & Bolognese, 2022](#)).

Scholarship in technical communication; engineering education; and science, technology, engineering, and mathematics (STEM) research practices has identified a gap in students' understanding of citation practices; this gap mirrors the disconnect we have observed, namely that students have difficulty recognizing how their past citation experiences and knowledge can transfer to different citation styles and academic disciplines ([Blicblau et al., 2016](#); [Feldmann & Feldmann, 2000](#); [Fernsten & Reda, 2011](#)).

We begin this review by positioning our study in relationship to the scholarly literature on transfer. We then investigate citation practice instructional standards and expectations for K-12 students in the United States (U.S.) and Oregon, then discuss citation instruction in U.S. higher education using OSU's engineering and writing programs as a case study. In this study, we use the term "citation" to refer to the methods students and instructors use to locate, manage, integrate, and attribute sources across disciplinary contexts.

The Challenges of Transferring Citation Knowledge

While citation skills can often be understood as rote or formulaic, scholars in information science and writing studies alike have acknowledged that information literacy demands a flexible and adaptable mindset. To identify some of the basic competencies required to understand how, why, and when to integrate and attribute sources, the Association of College and Research Libraries adopted the “Framework for Information Literacy for Higher Education” in 2016. Aimed at creating a stable set of foundational information literacy principles in an ever-changing and increasingly chaotic information environment, the Framework emphasizes “conceptual understandings that organize many other concepts and ideas about information, research, and scholarship into a coherent whole” ([Association of College and Research Libraries, 2016](#)). Rather than listing a set of skills or methods to memorize, the Framework considers information literacy as a network of “threshold concepts, which are those ideas in any discipline that are passageways or portals to enlarged understanding.” Because the Framework is intended to work across disciplines, it does not offer guidance about citation skills needed in history and psychology and mechanical engineering; instead, it identifies the habits of mind that inform research and citation across scholarly contexts. Therefore, it uses threshold concepts like “Authority is Constructed and Contextual” and “Scholarship as Conversation” to guide faculty and students on the best practices for teaching information literacy in any discipline.

Threshold concepts have also been used in the field of Writing Studies to characterize the core premises or shared assumptions that enable full participation in disciplinary discourse ([Adler-Kassner & Wardle, 2015](#)). Similarly to information literacy, academic writing is a knowledge domain that applies to, and is taught within, all disciplines. While each discipline has its own set of conventions in these areas, there remain fundamental principles that hold true across disciplines: threshold concepts serve as the “foundational assumptions that inform learning across time” ([Scott & Wardle, 2015](#)). However, threshold concepts are complex in that they can feel basic or familiar to a disciplinary expert, but intangible or abstract to those new to a discipline. Threshold concepts often prove challenging for students to grasp as they navigate new disciplines, but they can also pose obstacles for instructors teaching writing and information literacy in Writing Across the Curriculum (WAC) or Writing in the Disciplines (WID) contexts. Many WAC instructors, while strong writers and researchers themselves, may struggle or doubt their own abilities to teach those skillsets to students ([Anson, 2015](#)). After all, an instructor teaching writing in mechanical engineering is familiar with their own subject area, but may have less familiarity with the disciplinary principles and best practices for writing instruction as represented by the threshold concepts discussed above, even if they are capable of putting the concepts into practice in their own work.

In a 2020 study on WAC and WID faculty’s narrative framing of threshold concepts, authors Basgier and Simpson refer to threshold concepts as “troublesome” while foundational for meaningful participation in academic discourses, threshold concepts are far from straightforward, and can feel elusive or imprecise in the process of learning them (“Trouble and Transformation in Higher Education”). Tracking instructors’ descriptions of their grasp of threshold concepts in the process of teaching writing in

WAC courses, the study notes how faculty themselves arrive at “shifts in thinking” and shared narratives of change as they gained familiarity and insight into the concepts along with their students. This suggests that learning threshold concepts can be “transformative” for students and teachers alike, but that the process of transformation can be non-linear and slippery for all involved ([Basgier and Simpson 2020](#)).

These threshold concepts, and the difficulties of integrating them into existing knowledge for both students and instructors, are rooted in the educational theory of transfer. Transfer refers to the processes by which students adapt skills from previous learning contexts into new ones ([Adler-Kassner & Wardle, 2015](#); [Haskell, 2001](#); [Perkins & Salomon, 1988](#); [Yancey et al., 2014](#)). Rather than cutting-and-pasting knowledge from one situation to another, learners must find novel ways of “thinking, perceiving, and processing information,” which demands increasingly creative, critical, and analytical thinking as the types of tasks get farther apart ([Center for Engaged Learning, 2015](#); [Haskell, 2001](#); [Perkins & Salomon, 1988](#)). Writing in 1988, education theorists David Perkins and Gavriel Salomon identified the concepts of “near” and “far” transfer, where near transfer involves tweaking a previously learned skill to fit a new but recognizable context, and far transfer involves the deliberate adaptation of an existing skill to a distant or unexpected context ([Perkins and Salomon, 1988](#)). Scholars of transfer widely agree that far transfer involves mindfulness, metacognition, and sophisticated critical thinking not just about how to complete a task, but why specific strategies work and how to amend those strategies for new purposes ([Center for Engaged Learning, 2015](#)).

Transferring citation practices across disciplines could certainly be said to fall under the “far transfer” category. Learning citation practices entails not simply the memorization of citation formats, but the ability to evaluate sources for credibility and relevance, synthesize interconnected ideas and put them into conversation with new findings, and seamlessly incorporate others’ ideas into one’s own work according to disciplinary conventions. With a lack of consistency, support, or interdisciplinary conversation about how to teach citations and encourage the kinds of metacognitive capacities required to move from one disciplinary information setting to another, it’s no wonder that students might struggle to make those disciplinary leaps on their own. This challenge lies at the heart of our study, for the gaps in knowledge that Engineering faculty recognize likely relate to students’ difficulty in transferring knowledge about one citation format or set of expectations into a new disciplinary setting.

Citation Instruction in U.S. High Schools with a Focus on Oregon

There is no standardized national curriculum for teaching citation practices across high schools in the U.S. The national Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects (commonly referred to as Common Core) provides vague guidance about citation instruction, stating that students should use “a standard format for citation” in grades 7-12 ([Common Core State Standards Initiative, 2010](#)). Similar language is used in the Oregon Department of Education’s standards, which require students to use “a standard format for citation” ([Oregon Department of Education, 2019](#)). The American Association of School Librarians (AASL) AASL Standards Framework for Learners does not mention citation practices at all ([American Association of School Librarians, 2018](#)).

The Oregon Association of School Libraries (OASL) has detailed learning goals for citations in the “OASL School Library Grade-Level Learning Goals” adopted in 2015 and revised in 2019 ([Oregon Association of School Libraries, 2019](#)). In these standards, students begin in the third grade learning to “use information to answer questions and inspire further investigation” and to “create a citation using basic formatting and punctuation for author, title, and publication date.” By the 11th and 12th grades, they are expected to “create accurate citations and bibliographies using varying citation styles (MLA, APA, Chicago/Turabian)”.

Although the OASL standards are robust compared to Common Core standards and the Oregon Department of Education’s standards, most Oregon public schools do not have licensed school librarians. In the 2021-2022 school year, there were 1,274 public schools serving 553,012 students and only 158 licensed school librarians ([State Library of Oregon, n.d.](#)). With so few librarians, classroom teachers are largely responsible for citation instruction, and it is unlikely they are familiar with the OASL standards.

In 2016, a librarian and science professor at the University of South Carolina Aiken evaluated middle and high school student research reports from two regional science fairs and one state science conference ([Vieyra & Weaver, 2016](#)). Of the 198 reports analyzed, 93% included bibliographies, but only 43% of those were coded as “all information is present,” and only 32% of the reports included in-text citations. The researchers argue that rewarding reports that would be considered plagiarism at the college level reinforces citation behaviors that could lead to academic misconduct in college.

A 2016 nationwide study surveyed a random sample of high school and academic librarians about the information literacy gap between high school and college ([Saunders et al., 2017](#)). Sixty-seven percent of high school librarians reported spending substantial time teaching students how to “cite sources properly,” more than any other information literacy skill, yet only 39% of academic librarians believed high school students were being taught to “cite sources properly.” Although not mentioned in the article, this gap may exist, at least in part, because of a lack of licensed high school librarians in states like Oregon, and while the article calls for more conversation between members of the American Association of School Librarians and the Association of College and Research Libraries, in Oregon this conversation is moot with such a small number of licensed middle and high school librarians.

Citation Instruction in U.S. Higher Education

Responsibility for teaching citation practices in higher education is difficult to determine. Students commonly encounter college-level citations and research for the first time in their first-year writing courses, though increasing numbers of students receive credit for first-year writing in AP or dual-credit settings. Nationally, students enroll in 2.5 million dual-credit courses per year, and while it is difficult to track how many of those courses replace first-year writing because policies differ by state and institution, we know that Oregon K-12 students received an average of 8.6 college credits per student ([Velasco et al., 2024](#); [HECC 2024](#)). At OSU, we estimate based on enrollments in first-year writing versus intermediate writing courses that no fewer than

35% of first-year students enter with their first-year writing credit completed pre-college ([Institutional Analytics and Reporting, 2025](#)). At the same time, we know little about the exact instruction students receive about citations, because dual-credit options are vastly dispersed across institutions and have varied curricula based on state or program policies, not all of which is transparent to the institutions receiving those credits ([Gentle-Genitty & Weber, 2022](#)).

All of these factors make it increasingly difficult to track where and how students are learning about citations, and more difficult for teachers to know what to expect about the learning experiences their students have had, as well. As students transition from high school to college, they may or may not have received explicit citation instruction, or they may have learned about citations multiple times but in different ways. As mentioned in the introduction, we frequently hear students' frustrations about receiving repeated citation instruction. Ironically, this may be due in part to students' higher confidence in their citation skills; a study comparing undergraduate engineering students' perceptions of their own citation knowledge to practicing engineers demonstrated that "students have higher levels of confidence in their information abilities than engineers" ([Phillips et al., 2019](#)). Students may perceive that they've already learned what there is to know about citations due to the common "one-shot" approach where students (sometimes) learn about citations early in their college careers, then may not receive further instruction until they reach their discipline when it is delivered in one fell swoop ([Liu, 2021](#)). As we know from the literature on transfer, this move from general to specific requires a cognitive leap where students must understand how any prior citation knowledge can be adapted to the current information context. These issues are compounded by the fact that the number of different citation styles a student may encounter and need to apply is also difficult to track—one need only consult the citation management software Zotero to see that there are over 10,000 citation styles in its Zotero Style Repository ([Zotero Style Repository, n.d.](#)). Altogether, this creates a dynamic where instructors don't know what students have learned about citations (or from whom), students may not understand how any citation practices they've learned apply to future situations, and there is often a lack of institutional consensus about who should be teaching citations in the first place.

In an attempt to answer the question, "Who provides in-person citation instruction in composition and writing classes?", one researcher deployed a survey to several librarian listservs in 2016 ([Schwartz, 2019](#)). A total of 176 completed surveys identified English/composition faculty as the top instructors (n=146), next were librarians (n=124), and finally writing center staff (n=83); and in addition, several respondents chose N/A (4). Although this study may provide some indication of who is teaching citation practices, it has several limitations. First, the survey was sent only to librarian listservs; librarians may or may not know what faculty in other disciplines, such as English and composition, are doing in their classrooms. Second, the survey only asked about citation instruction in composition and writing classes.

We sought a similar understanding of citation instruction in the STEM disciplines. Research into students' understanding of source use in STEM fields indicates that students don't immediately grasp the best practices for finding and incorporating sources into their own work. In a 2022 study examining students' perceptions of

primary sources in science writing, Kristin M. Klucsevsek acknowledged the role of failure, mistakes, and experimentation in learning how to locate, incorporate, and attribute primary sources ([Klucsevsek, 2022](#)). Examining where science writing students' citation errors might come from, Klucsevsek interviewed 364 students in science writing contexts across multiple fields and in all four years of undergraduate study, along with graduate students, at Duquesne University. In the study, upper-class and graduate students reported that they had not yet fully learned to write for the sciences until their final year of undergraduate study ([Klucsevsek, 2022](#)). Meanwhile, students interviewed in their first year "were already confident they had learned about plagiarism," but reported lower confidence in analysis, paraphrase, and other basic citation skills. In addition, many of the higher-order citation skills such as "deciding which information can be used" or "deciding which information fits the need" proved challenging for students across levels of experience. Klucsevsek calls for a stronger emphasis on adaptable research practices starting earlier in students' academic careers.

Institutional Context

We chose the OSU College of Engineering (COE) as the focus of this study because it is the largest college within our institution, with more than 30% of the 30,000 enrolled undergraduates ([Office of Institutional Research, 2022](#)); and because the citation disconnect shows itself most plainly in engineering citations, both in our anecdotal experience and in the literature. Selecting OSU's COE seemed the most direct area for study of whether that perceived disconnect would play out in our survey of engineering instructors' expectations of their students' citation skills.

Since the survey targets engineering instructors' perceptions of where and when students should learn discipline-specific citation styles, we should also note the role of OSU's Writing Program, which delivers first- and second-year writing courses in a horizontal writing curriculum that equips students to enter their Writing Intensive Curriculum (WIC) course, an upper-division writing course taken in the major. OSU's writing curriculum begins with Composition I (WR121z), a foundational writing course that teaches basic citation practices along with the rhetorical and ethical purposes for using citations in academic discourse broadly conceived. After taking this required course (for which increasing numbers of students gain credit before they enroll at OSU, through Advanced Placement tests or dual-credit options through high schools and community colleges), students can select from a number of intermediary writing courses that prepare students to write within particular knowledge domains: students in the humanities or social sciences may take Advanced Argument (WR 323), students in the natural sciences often choose Science Writing (WR 362), and a majority of students across STEM backgrounds either select or are required to take Technical Writing (WR227z). OSU's technical writing course is most pertinent for our study, since all students in the COE are required to take it, and OSU even offers a specialized engineering version of the course that lays the groundwork for the capstone project engineering students complete at the end of their studies. The engineering-specific Technical Writing course (WR227zE) offers instruction on IEEE citations, along with projects and discussions targeting rhetorical and professional expectations around citations in engineering disciplines.

Methodology

The survey OSU Instructor Experiences with Undergraduate Student Citation Practices, hereafter referred to as The Survey, was developed and administered by the Oregon State University Survey Research Center in collaboration with the authors. The Survey investigated OSU engineering instructors' expectations for undergraduate students' knowledge of citation practices and their opinions about the placement of responsibility for teaching citation methods to students. Questions were grouped by:

- Faculty perceptions of student preparedness and skill level. This included questions about specific types of skills or knowledge, for example, knowing how to use citations to avoid plagiarism.
- Expectations about students in lower division courses (100-200 level).
- Expectations about students in upper division courses (300-400 level).
- Opinions about citation teaching responsibilities.

The subjects selected to participate in this study were active-status OSU professors, instructors, research faculty, and graduate teaching assistants in undergraduate engineering courses between 2021 and 2023; 374 individuals were identified as fulfilling these criteria – they will be collectively referred to as instructors hereafter. The Survey was developed and administered using Qualtrics software (<https://www.qualtrics.com>). The OSU Internal Review Board (IRB) was consulted before administering the survey, and the study was rendered exempt from review.

On May 8, 2023, the instructors were emailed a prenotification about the coming survey via Qualtrics. On May 10, the first invitation email and a link to the Qualtrics survey were sent. On May 16, the first reminder email was sent to all non-respondents. On May 23, a final reminder email was sent to the remaining non-respondents with a survey closing date of June 1. The online survey concluded on June 1, 2023, after 24 days of data collection.

The American Association for Public Opinion Research (AAPOR) rate calculator was used to determine the completion rate ([American Association for Public Opinion Research, 2022](#)). (Table 1). The AAPOR RR3 adjusted response rate for this survey was 21.8%. The AAPOR response rate calculator and standards are designed to provide standardized, transparent calculation of response rates, rather than to judge whether a response rate is good or bad. The intent is to make response rates comparable across studies and contexts and to clarify how nonresponse is handled in the calculation. The AAPOR standard is considered an established convention within the survey research community ([Hermann & Lemcke, 2017](#)).

Table 1. Return dispositions and adjusted response rate, all groups

Description	Frequency	Percent
Completed	76	20.3%
Refusal/Break-off	9	2.4%
Undeliverable email address	14	3.7%
Deceased	0	0%

Outside frame (does not teach Engineering, No longer at OSU, On sabbatical, and maternity leave)	6	1.6%
Email opened, nothing returned	164	43.8%
Nothing returned	105	28.1%
Total	374	100%
Unadjusted Response Rate		20.3%
AAPOR RR3 Adjusted Response Rate		21.8%

After administering the study, the OSU Survey Research Center prepared a Report of Procedures and Results; which is used to inform this Methodology section and the following Results section.

After reviewing the Report, the authors of this article analyzed all open-ended text-based responses. In order to analyze the text-based responses, we used Taguette.org, a free open-source qualitative research tool. First, responses were uploaded to Taguette. Next, responses were reviewed by the authors. Finally, they were “tagged” and sorted into researcher-identified topics and subtopics.

The responses analyzed came from several questions. Three questions had “other” options that provided a space for respondents to enter a text response. In addition to those three questions, one question on the survey asked, “In your Opinion, do you feel it is your professional responsibility to teach citation practices in your classe(s)?” If the instructor chose, “Yes, I feel I have a professional responsibility to teach citation practices,” the survey automatically directed them to the open-ended question, “Why do you feel you have this responsibility?” If they answered, “No, I do not feel I have a professional responsibility to teach citation practices,” the survey automatically directed them to the open-ended question, “Why do you feel this is not your responsibility?” The final question on the survey asked, “What else would you like to say about citation practices and student’s proficiencies in this area?”

Results

Participants

Out of 76 respondents, 42% identified as professor, associate professor, or assistant professor; 40% identified as instructor/senior instructor; and the remaining 18% identified as research faculty, graduate teaching assistant, or other (Table 2).

Table 2. Total number of respondents

Participants	Number	Percent
Professor, Associate Professor, Assistant Professor	32	42%
Instructor/Senior Instructor	30	40%
Research faculty, Graduate Teaching Assistant, Other	14	18%
Total	76	100%

An initial question in the survey was used as a filter to screen out those instructors who had not taught in the time frame examined in this study. Three out of the 76 respondents indicated they had not taught during this time frame and were screened out of the survey. Out of 73 individuals who had taught undergraduate students in the

last two years, 37% had five years or less experience teaching undergraduate engineering courses, 23% had five to 10 years, 21% had 10-15 years; 5% had 15-20 years, and 12% had more than 20 years experience.

Missing Citation Knowledge or Skills

Engineering instructors were asked to think about their lower and/or upper-division students and asked, "...is there knowledge or skills you see missing regarding citation practices?" 29% indicated that knowledge or skills regarding citation practices were missing a lot in their students, 47% indicated they were missing some, and 8% indicated they were not missing. Another 16% were not sure (Figure 1).

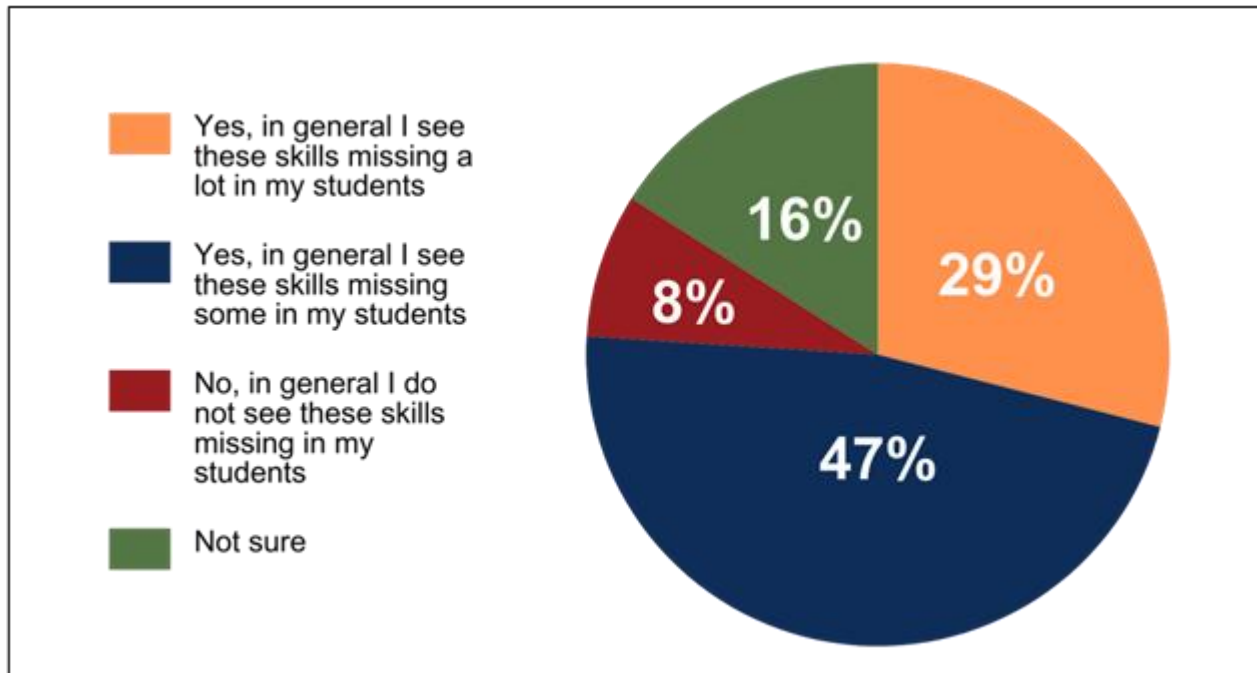


Figure 1. Instructor observations about citation knowledge or skills in engineering students.
Note. This figure shows engineering instructor responses by percentage to the question: "Thinking about all of your lower and/or upper-division students, is there knowledge or skills you see missing regarding citation practices?"

For the instructors who indicated knowledge or skills regarding citation practices were missing a lot or some (76% in Figure 1, n=55), a follow-up question asked what types of skills or knowledge were missing in their students (Figure 2). Instructors could choose more than one answer. 65% of the instructors indicated students were missing the ability to evaluate sources for their credibility and suitability, 62% indicated they were missing the ability to build from sources to generate original ideas, 49% indicated students were missing the ability to integrate content from outside sources according to disciplinary conventions, and 44% indicated they were missing the ability to avoid plagiarism by adhering to disciplinary expectations for appropriate attributions.

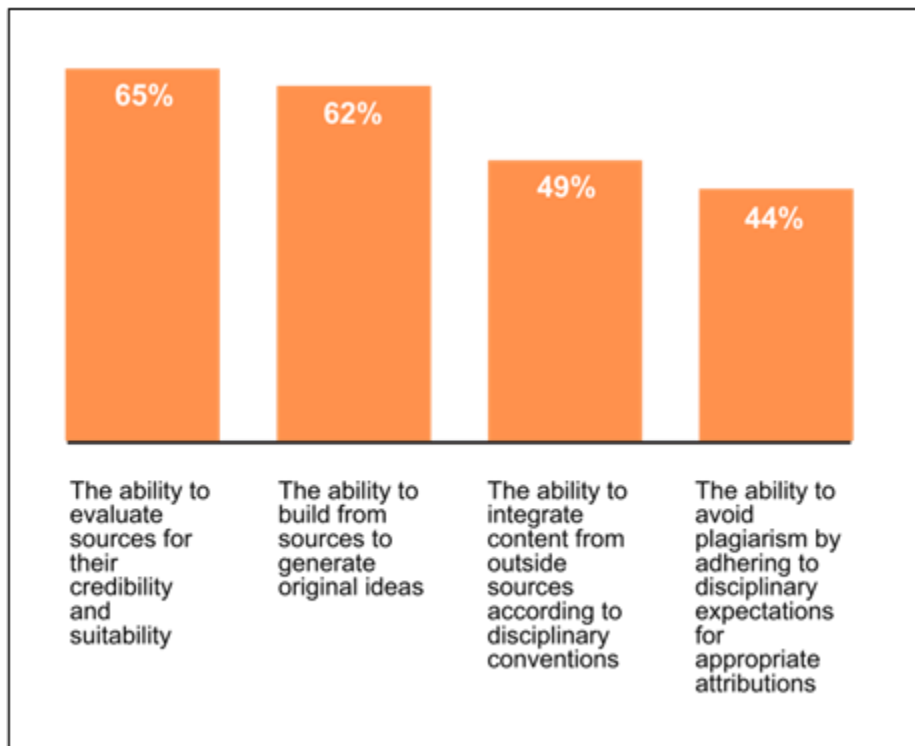


Figure 2. Instructor observations about types of knowledge or skills missing in engineering students.

Note. This figure shows responses to a follow-up statement that was posed only to instructors who indicated that knowledge or skills regarding citation practices were missing a lot or some in upper and/or lower division engineering students (n=55). The follow-up statement asked instructors to "Please indicate the types of citation skills/knowledge you see missing in your students."

Instructors shared more information about missing citation skills in their qualitative responses. Of particular note, several instructors commented on students' inability to cite engineering-specific materials such as code, data sheets, and software. For example, one instructor wrote, "...most students know how to cite papers, but very few know how to cite code. This needs to be addressed as most CS [Computer Science] students will take more than one coding class."

Expected Citation Knowledge or Skills

To better understand engineering instructors' expectations of lower and upper-division engineering students, we asked what citation knowledge or skills they want students to have when entering their class (Figure 3). Instructors could choose more than one answer. Most instructors wanted their lower and upper-division students to have a baseline knowledge of the need to cite sources (70% and 74%, respectively), although more upper-division instructors (68%) wanted students to have a working knowledge of how to cite and integrate sources over lower-division instructors (41%). In addition, only 19% of lower-division and 37% of upper-division instructors wanted students to have some previous experience with citing in engineering-specific formats (IEEE, ACM, CEP, ASCE, ASME); 11% of lower-division and 26% of upper-division instructors wanted students to enter class with knowledge on how to use citation management software such as Endnote, Zotero, or Mendeley.

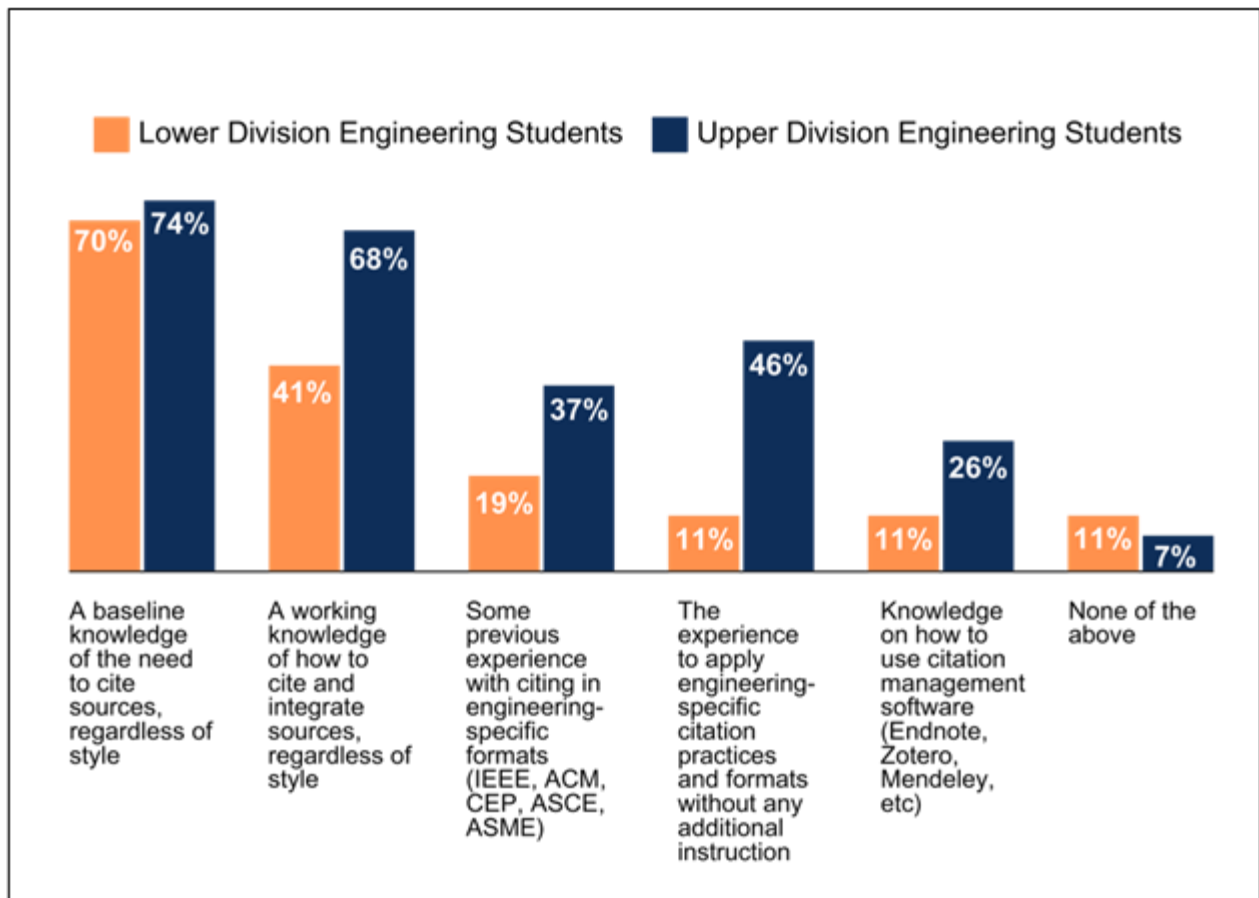


Figure 3. Instructor baseline expectations for entering engineering students.

Note. This figure shows engineering instructors' responses to two prompts. (1) In lower-division engineering classes that I teach, I want students entering the class to have... (Select all that apply.); and (2) In upper-division engineering classes that I teach, I want students entering the class to have... (Select all that apply.)

Teaching Citation Practices

When asked who should teach (or who should have taught) OSU undergraduate engineering students about citation practices, a majority of the instructors surveyed – 77% – believed that this responsibility should fall to writing instructors within the Writing Program, at least for non-engineering-related practices. However, 81% of instructors expressed that engineering instructors should take charge of teaching citation practices that are specific to engineering. Only 34% of responding instructors felt that OSU Librarians should be responsible for teaching general citation practices (not related to engineering). Also of interest, only 30% of respondents indicated that students should have learned general citation practices before coming to OSU.

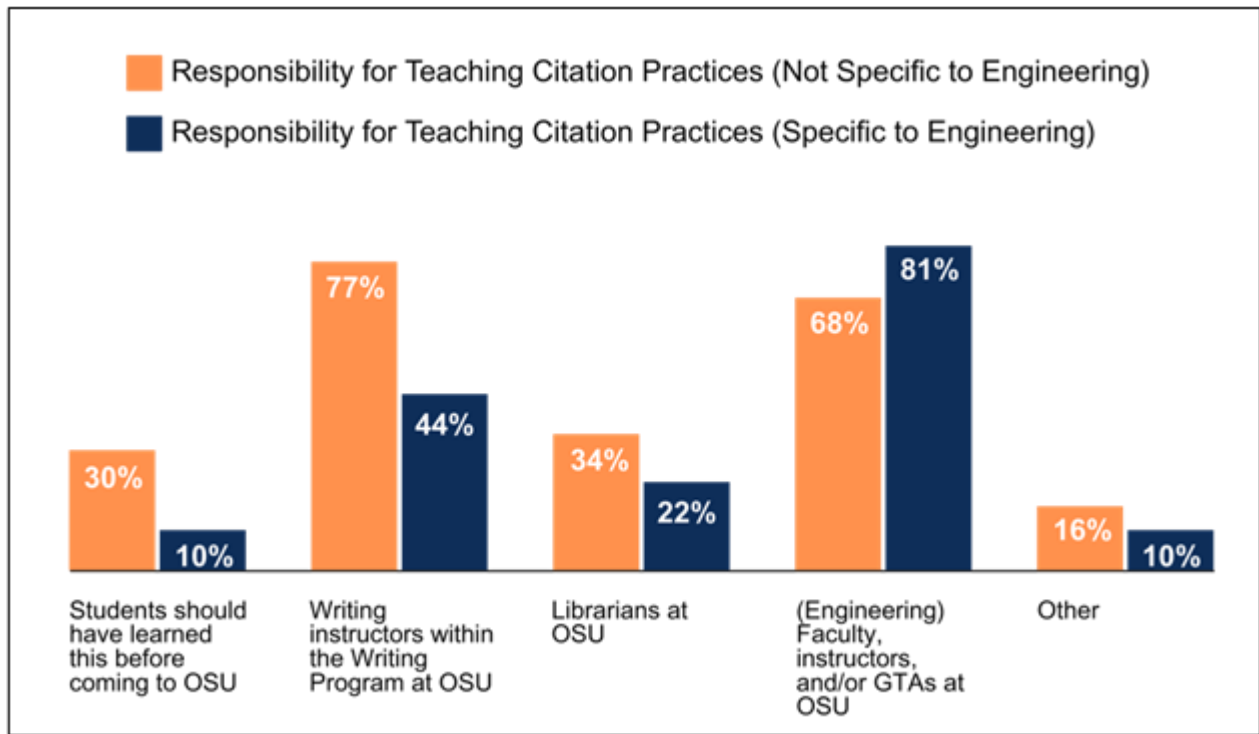


Figure 4. Instructor opinions about responsibility for teaching undergraduate students about citation practices.

Note. This figure shows engineering instructors' responses to two questions. (1) In your opinion, who is responsible for teaching OSU undergraduate students about citation practices, generally (not specific to engineering)? (Select all that apply.); and (2) In your opinion, who is responsible for teaching OSU undergraduate students about citation practices, generally (specific to engineering)? (Select all that apply.)

Five instructors added additional comments about teaching citation management software, for example, "There is no point in spending time on specific citation formats, because this is not something you will ever manually format. This is what reference management software should handle (aside from checking for issues and correcting). Citation format changes from journal to journal, and there is no 'field-specific format.' So, just focus on teaching students the key elements of all citations and how to use management software," and, "It would be cool to have time to show students how to use citation management software," and, "Teaching students to use tools to keep track of citations will encourage them to cite their sources since keeping track and formatting is no longer a huge burden."

Discussion

Our study sought to explore two key questions: What do engineering instructors want undergraduate students to know about citation practices? Who do they believe should be responsible for teaching these practices—high school teachers, librarians, engineering instructors, or writing instructors? The findings of this study indicate that 41% of instructors want incoming lower-division undergraduates to have a working knowledge of how to cite and integrate sources, regardless of citation style; and 68% want upper-division students to have this skill (Figure 3). Instructors report that lower-division and upper-division undergraduate students are missing citation skills a lot or

some, (76% in Figure 1) when entering their classes. Engineering instructors place primary responsibility for teaching general citation practices on writing instructors (77%) and primary responsibility for teaching engineering-specific citation practices on engineering instructors (81%) (Figure 4).

We were surprised to find that the majority of engineering instructors do not expect students to come to OSU with general knowledge of citation practices (Figure 4). In contrast, we, the authors of this article, assume that students receive citation instruction in high school from their teachers or librarians. However, as we outlined in the literature review, in Oregon and nationwide, standard guidelines on how and what to teach about specific citation standards are lacking. Are high school students being taught the specific citation style of the Modern Language Association, as favored by the Writing Program at OSU and English instructors in higher education throughout the United States? No published information is available to answer this question.

There was variability in the open-ended responses from engineering instructors with regards to who should be teaching citation practices. Engineering instructors shared opinions such as, "Writing should be taught at every level as engineering education is a vital part of students [sic] experience learning how to write reports, track their research progress, and communicate their thoughts and designs" to "Reflecting on my own education I didn't have to be taught citation practices. I just looked at how authors cited others in articles I read...So I expect some degree of self teaching." Overall, we observed a number of approaches to dealing with the gaps between what students know about citations when they enter engineering versus what they need to know to succeed, with some instructors calling for "a prerequisite skills module" along with "consistent expectations in the programs agreed upon by faculty," others adapting their teaching by adding new assignments like literature reviews to teach citations, and another reporting that "I have changed my class content to avoid dealing with the issue." A holistic view of the open-ended responses suggests that engineering instructors are creating their own solutions to address their students' lack of citation knowledge, and that those solutions are not always consistent.

Implications for Teaching Citations

Given the relative unpredictability of what citation skills students will bring to their engineering courses, along with the general consensus among engineering instructors that it falls to engineering programs to teach discipline-specific citations, writing programs should prioritize teaching students to think flexibly and critically about citations, so that they can adapt their citation practices across disciplines with a deeper awareness of why citations are important in the first place. Librarians should note potential collaboration opportunities with writing classes, as citation instruction via the creation of LibGuides and reference consults is already part of the practice of many in the profession. The results of this study align with the literature on learning transfer, the process by which students adapt skills from previous learning contexts into new ones, since at least some of students' gap in citation knowledge can be attributed to the difficulty in adapting knowledge from one context to another ([Adler-Kassner & Wardle, 2015](#); [Haskell, 2001](#); [Yancey et al., 2014](#)). Regardless of what citation skills students have when they arrive in their engineering courses, they'll need to be able to translate any

existing knowledge to meet often-shifting expectations in their discipline, so writing instructors can be most efficient by teaching the underlying principles of citations (the ethics of attribution, how to avoid plagiarism, determining a source's credibility, how to use citation software) rather than memorization of any one citation style. In our own institutional context, this would mean increasing dialogue between the Writing Program teaching citations in a transfer-way, and engineering faculty teaching writing-intensive courses in their disciplines, so that engineering faculty are aware of the instructional approach and content that their students will have already encountered.

We would also like to note that inconsistencies in students' skills and knowledge of citation practices may be due to the timing of their enrollment in the Technical Writing (WR227z) course. Students are not enrolled in the course at the same time, so some first or second year students might demonstrate higher level skills than third or fourth year students that have not taken the course.

Research Limitations and Future Possibilities

As mentioned previously, no published research exists about the citation styles taught in K-12 education across the United States. A useful baseline study would include an assessment of how and when students are taught citation styles, as well as which citation styles are taught. Such a study would help writing instructors meet students where they are in their knowledge of citation practices, so that students would have a more consistent foundation in citations before entering their academic fields of study.

This study was limited to engineering instructors at one public, large, research university (R1) in Oregon. Duplicating this study at other colleges or universities would increase the generalizability of the research results. In addition, our methodology for this study was limited to one online questionnaire. Follow-up interviews may have revealed useful insights. For example, more details regarding how engineering instructors are filling the gaps in citation instruction, or not, in the case of the instructor changing the course content.

Conclusion

Citations are a fundamental part of academic writing and are essential to learning how to participate in a scholarly or professional discipline. Instructors agree that knowing how and what to cite is an important skill for students at the university level. However, acknowledging the importance of a skill does not mean that there is agreement on when citation skills should be taught. As a part of our study, the majority of instructors reported that students often lack essential citation skills when entering both lower- and upper-division courses. As a result, and without a centralized approach to guide citation instruction, engineering faculty arrive at their own pedagogical strategies to fill gaps in students' knowledge.

This initial study has uncovered a disconnect between engineering instructors' expectations and students' citation skills at OSU. Although our study was limited to the engineering discipline, we hypothesize that a similar disconnect exists in other disciplines, based on anecdotes and conversations with instructors from other

disciplines. This gap underscores the need for a more cohesive approach to teaching citation practices, bridging the educational transition from high school to college. We encourage writing instructors and librarians engaged in information literacy instruction to emphasize the underlying principles of citations, guiding students to think critically about how and why to integrate and attribute sources, so that they can more easily adapt their knowledge to new disciplines. We also encourage further communication between disciplines in higher-ed settings around citation practices, along with a deeper exploration of what students learn about citations in K-12 and how they apply that knowledge in college.

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CRedit authorship contribution statement

Kristy Kelly: Conceptualization (equal), Methodology (support), Writing - Original Draft Preparation (equal), Writing - Review & Editing (equal). **Diana Park:** Conceptualization (equal), Methodology (support), Writing - Original Draft Preparation (equal), Writing - Review & Editing (equal). **Adam Lindsley:** Conceptualization (equal), Methodology (support), Writing - Original Draft Preparation (support). **Laurie Bridges:** Conceptualization (equal), Funding Acquisition (lead), Methodology (support), Writing - Original Draft Preparation (equal), Writing - Review & Editing (equal). **OSU Survey Research Center - Lydia Newton and Jessica Robinson-Waninger:** Formal Analysis (lead), Methodology (lead), Writing - Original Draft Preparation of Methodology (support).

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