Faculty Professional Development in Engineering Lab Writing Pedagogies through a National Workshop

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Abstract

This paper presents the delivery and assessment results of a Sunday Workshop on engineering lab writing pedagogies at the 2024 ASEE Annual Conference, offered by a collaborative research team supported by the NSF. Thirty engineering educators across the nation participated in an intensive workshop, with the goal of improving their writing pedagogies in engineering labs. Workshop participants were given access to the learning transfer-focused instructional guides available at engineeringlabwriting.org to design and develop lab report assignments and assessments, aiming to enhance students' lab writing in sample lab topics. Small groups also discussed the issues related to lab writing and how to deliver lab writing expectations and provide feedback to students clearly and concisely. Pre-survey results show that the participants showed varying levels of familiarity with rhetorical elements of writing and writing pedagogy. There was general agreement on the value of workshops for professional development in lab writing. In the post-survey, participants reported the guides were extremely helpful in improving their understanding of audience awareness and writing pedagogy strategies. Most participants felt confident in developing rubrics and providing productive feedback on students' lab reports with the use of the guides. Respondents suggested extended workshop time, greater variety in activities, and more diverse examples and samples to provide a broader context. During the open discussion, participants raised issues with scaffolding approaches, faculty time, TA support, and generative AI as an assessment tool. Overall, the workshop helped establish a sense of community among participants across the nation, enhancing their interest in lab writing and teaching.

1. Introduction

Engineering students often excel in laboratory experiments but face significant challenges in lab report writing [1]-[3]. At the same time, lab instructors, despite being professional writers, encounter difficulties in teaching writing to undergraduates due to limited training and

instructional resources [4],[5]. Lab report writing plays a crucial role in engineering education, addressing key program outcomes such as ABET Outcome 6 (experimentation and analysis) and ABET Outcome 3 (communication) [6]-[8]. To address this gap, a cross-disciplinary team of engineering and writing faculty, supported by an NSF IUSE grant, developed comprehensive engineering lab writing guides (available at engineeringlabwriting.org) that have had extensive testing by approximately 20 engineering lab instructors across three engineering disciplines (civil, electrical, and mechanical engineering) at five institutions (two 2-year and three 4-year schools) [9]-[11]. These guides are transformative because they promote engineering undergraduates' writing transfer, linking lab writing instruction to prior writing experiences, mostly focusing on first-year-composition and technical writing [12]-[15]. The instructional materials consist of two components:

1) An Instructor's Guide that focuses on designing and assessing lab assignments.
2) A Student's Guide that provides targeted support to achieve lab writing outcomes.

Over the past three years, these guides have been used at five institutions (i.e., Clark College, Oregon Institute of Technology, Portland Community College, University of Portland, and Washington State University Vancouver) in the Pacific Northwest to improve lab report writing in entry-level engineering laboratory courses. Evaluation data suggest that these guides enhance both instructors' lab writing pedagogy and students' writing performance [11],[14]. In addition, instructors report a significant reduction in the time required for assessing lab reports [11].

The research team offered a Sunday workshop, entitled "Employing Engineering Lab Writing Guides to Support Lab Instructors and Students," at the 2024 ASEE Annual Conference. This workshop provided engineering lab educators with the opportunity to use learning transfer-focused instructional guides to design and develop lab report assignments and assessments, enhancing students' lab writing and instructors' writing pedagogy. The workshop also aimed to build a nation-wide community of practice focusing on engineering lab writing education. This paper presents the content, delivery, and results of the professional development workshop on engineering lab writing.

2. Workshop Content and Delivery

The workshop was designed for the participants to conduct the following in a small group setting: 1) develop engineering lab report assignments; 2) improve engineering lab report assessment; 3) guide students in navigating writing with generative AI (ChatGPT-4); and 4) train lab teaching assistants or lab report graders. Participants accessed the guides (available at engineeringlabwriting.org) to design and develop sample labs, discuss issues related to lab writing and how to deliver lab writing expectations, and provide feedback to students clearly and concisely. Table 1 shows the workshop program, including the session topic and its time allocation. Figure 1 presents sample slides from the workshop that are based on the team's past research [9]-[29].

Table 1. Workshop program

Session topic	Time (minutes)
Introduction	10
Pre-survey	10
Our NSF project/Workshop overview	15
Workshop deliverable 1: Lab assignment design	55
Break	10
Workshop deliverable 2: Lab assessment design	30
Additional modules	10
Post-survey	10

The workshop registration was free and a total of thirty educators registered. Participants' academic disciplines included Civil Engineering (*n=10*), Mechanical/Aerospace Engineering (*n=8*), Chemical/Biological Engineering (*n=5*), Electrical/Computer Engineering (*n=3*), Tech writing (*n=2*), Engineering (*n=1*), and Physics (*n=1*). Pre-survey responses indicated fourteen female and ten male participants. The ASEE workshop included a diverse group of participants from various institutions across the nation. Participants included engineering instructors, graduate teaching assistants, and education researchers. The diversity of the participants' backgrounds ensured a rich exchange of ideas and experiences, contributing to the overall effectiveness of the workshop.

Engineering lab writing outcomes

Well-aligned with ABET Outcomes 3 (communication) and 6 (experimentation)

Writers in early engineering lab courses are able to	Mostly related to
1) Address technical audience expectations by providing the purpose, context, and background information, incorporating secondary sources as appropriate.	Introduction
2) Present experimentation processes accurately and concisely.	Methods
3) Illustrate lab data using the appropriate graphic/table forms.	Results
4) Analyze lab data using appropriate methods statistical, comparative, uncertainty, etc.).	Results Discussion
5) Interpret lab data using factual and quantitative evidence (primary and/or secondary sources).	Results Discussion
6) Provide an effective conclusion that summarizes the laboratory's purpose, process, and key findings, and makes appropriate recommendations.	Conclusions
7) Develop ideas using effective reasoning and productive patterns of organization (cause-effect, compare-contrast, etc.).	IMRDC
8) Demonstrate appropriate genre conventions, including organizational structure and format (i.e., introduction, body, conclusion, appendix, etc.).	IMRDC
9) Establish solid and consistent control of conventions for a technical audience (grammar, tone, mechanics, citation style, etc.).	IMRDC

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Deliverable 1: Lab assignment

- Activity 4: Each team reviews the sample lab's writing assignment by answering the module's three questions (5 minutes).

- Sample Tensile testing lab writing assignment

ABC, Inc. is developing a line of steel frames for use by an automaker. Please help us provide stress-strain c... de...rmine the mechanical properties of ...rial steels th... for steel frames ... present your response in th... ...hnical memorandum employing the IMRADC (Introduction ... Results-Analysis-Discussion- Conclusion) format. Submit this memo as a pdf along with a copy of the Excel file you d... the data. Thank you in advance ... to detail and professional work.

Unclear audience information

Unclear writing task expectations

No supplemental information

1 Define the lab writing task:

- the audience (who is the specific audience, such as instructors, engineers, peers, or the public?).
- the pedagogical purpose of the lab report (why is the assignment given?).
- the "fictitious" professional or academic purpose of the lab report (what is the context and genre of the report?).

2 Define expectations for the lab writing task:

- specific requirements related to the technical objectives.
- checklists or presentation expectations (format, submission, deadline, etc.).
- assessment rubrics (or any type of grading guidelines). The details of assessment rubric design and development are introduced in the Lab Report Assessment Rubric Module.

3 Provide supplemental and supporting materials:

- acceptable sample reports with or without addressing the standard conventions of finished and edited texts.
- unacceptable sample reports with or without addressing the standard conventions of finished and edited texts.
- a list of recommended reading resources.
- other resources to assist students' writing process.

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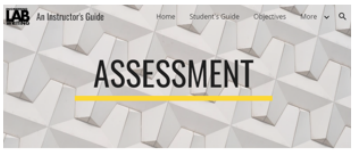
Deliverable 2: Lab assessment

- Activity 7: We will use an analytic rubric. Each team defines two criteria for the chosen lab objective. Use the sample rubric in the module. (10 minutes).

- Sample Tensile testing lab report assessment

2. Illustrate stress-strain data using the appropriate graphic form.
   - 2a: Construct figures using software such as Excel and Matlab
   - 2b: Use completed captions (figure number, title, axis title, legend, etc.) for all figures in the report.



Designing Lab Report Assessment Rubrics With Examples

Step 1: Define the purpose of the lab report assignment/assessment for which you are creating a rubric

Step 2: Choose a Rubric Type: Analytical vs. Holistic

Step 3: Define the Criteria

Step 4: Design the Rating Scale

Step 5: Write Performance Descriptors for Each Rating (Step 3 × Step 4)

Step 6: Build and Revise the Rubric

Analytic Engineering Lab Writing Rubric Example

Holistic Engineering Lab Writing Rubric Example

Conducting assessment (prepared for teaching assistants or group grading)

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Figure 1. Workshop slide samples

3. Workshop Results

The project consultant designed pre-post survey questions to investigate the effectiveness of the workshop on the participants' professional development, evaluate the module contents, and seek room for improvement on the project.

3.1 Pre/post Survey Results Summary

Pre-Survey Key Findings

Participants showed varying levels of familiarity with rhetorical elements of writing and writing pedagogy. Many participants had developed rubrics for their writing assignments and frequently revised instructional materials. There was a general agreement on the value of workshops for professional development.

Post-Survey Key Findings

Participants reported significant improvements in their understanding of rhetorical elements of writing and writing pedagogy strategies. Most participants felt confident in developing rubrics and providing productive feedback on students' lab reports. They also noted that the workshop helped establish a sense of community among participants, enhancing their interest in lab writing and teaching.

3.2 Key Findings from the Participants' Survey and Open Discussion

Years of Teaching

The survey data revealed a diverse range of teaching experiences among the workshop participants. Nine participants had five or fewer years of teaching experience, indicating a significant presence of relatively new educators. Four participants had between five and ten years of experience, while two had been teaching for ten to fifteen years. Three participants had over fifteen years of teaching experience, showing expertise within the group. Notably, all participants reported that they teach a lab at least once per year. Additionally, sixteen out of eighteen participants required their students to submit at least two lab reports per year, while the

remaining two did not require lab reports. Eleven of the eighteen participants personally graded the lab reports, reflecting a hands-on approach to student assessment.

The Use of Rubrics

The use of rubrics for technical content was universally reported among the participants, with all eighteen having utilized rubrics before. Fifteen participants had used rubrics specifically to grade writing, and fourteen had experience designing their rubrics. This high level of familiarity with rubrics contrasts sharply with the findings from earlier Community of Practice (CoP) sessions [9], [10], where newer faculty members often had no exposure to rubrics. This discrepancy highlights the importance of workshops and professional development opportunities in bridging the gap in knowledge and practice among educators.

Assignment Design

When it came to assignment design, ten out of eighteen participants reported having experience designing assignments similar to what was presented in the workshop. This indicates that most participants were not only familiar with but also actively engaged in creating effective assignments that aligned with the instructional strategies discussed during the workshop. This experience likely contributed to their ability to fully engage with and benefit from the workshop content.

Reasons for Attending the Workshop

The respondents attended the workshop for various reasons. Six aimed to gain new or different ideas from their peers, and five focused on improving their teaching methods. Three were interested in improving the efficiency of their teaching and grading processes, while another three sought to enhance the quality of student reports. Additionally, two participants aimed to strengthen their assessments, and two were keen on learning best practices. One participant attended for professional development purposes.

Skills Participants Hoped to Gain from the Workshop

Respondents expressed a range of skills they hoped to gain from the workshop. Six participants sought ways to make grading more efficient, while four were interested in keys to student success and producing better reports. Three participants aimed to improve their teaching, and

another three sought new ideas and tools. Two participants wanted to provide better feedback to their students, and one was focused on developing better assignments.

Workshop Positives

The workshop was praised for several positive aspects. Five participants highlighted the collaboration with peers as a critical benefit, with one participant citing "time to collaborate and discuss improvements" Three participants positively noted assessment and rubric design, and three others appreciated the focus on assignment design. "Being able to work through each assignment with a partner," was found be be very beneficial. Additional positives included: 1) Establishing writing objectives, 2) Exploring the modules, 3) Learning about ChatGPT, 4) Understanding scaffolding, and 5) Discussing the importance of specifying the audience.

Addressing Diversity, Equity, and Inclusion (DEI) Issues in Lab Writing

During the open discussion, many participants expressed concerns about students using ChatGPT for their lab writing. They provided positive feedback on the "Writing with AI" module in the Instructor's Guide, which can help engineering lab educators establish clear and appropriate AI policies for lab writing. Multiple participants also raised DEI-related concerns, including unequal access to generative AI tools, cultural insensitivity in AI-generated content, and bias inherent in AI training data.

3.3 Module Evaluation Results

Useful Instructor Guide

Five participants deemed the objectives of the instructor's guide to be the most useful aspect, highlighting the importance of clear objectives in hands-on work "They all seem useful, but especially the learning objectives module," said one person. Four participants found all parts of the guides useful responding simply with "all of it", while three specifically mentioned assignment design. One participant mentioned feedback and assessment as particularly useful.

Useful Student Guide

Regarding the student's guide, three respondents found all sections useful, while another three highlighted the conclusions section as particularly helpful. One participant mentioned the results

section, but four indicated they did not look at the student guides or found them not applicable. One participant liked "the idea of sharing the modules sequentially throughout the semester."

Changes as a Result of Attending Workshop

Respondents reported various changes they planned to implement after attending the workshop, and we grouped their responses. First, multiple respondents expressed interest in implementing a scaffolding approach. Some examples include "Scaffolding of writing objectives, separating out technical objectives from written" and "I will plan to build the writing assignments gradually throughout the semester," and "Differentiate content for freshman versus senior." The second group responded their interest in improving assignment and assessment. Their responses include "alter how I introduce each assignment and breaking down each piece differently," "Focusing on the objectives for my new course more," "Incorportaing more TiLT (Transparency in Learning and Teaching) into assignments when possible," and "Through writing assessment rubrics." Lastly, some participants were interested in building resources and supporting instructor preparation. Examples include "Improving TA resources," and "Time to do the work." One participant, who is already doing many of the things discussed, still found room for improvement stating

> I already do a lot of scaffolding, make and provide rubrics, provide assignments with context of a scenario, etc. but I realized while in this workshop it would be useful to do some small exercises in class focusing on having them practice writing skills in small sessions in class with feedback. I've been reading Small Teaching lately and this workshop helped me realize how to implement things from that in my lab lecture periods.

This diversity in planned changes suggests that the workshop addressed a broad spectrum of needs and provided valuable insights across different areas of teaching and assessment for a diverse group of engineering lab instructors.

3.4 What Needs Improvement

The surveys revealed several unexpected findings that provide additional insights into the project's impact and areas for improvement. These findings were not anticipated at the project's inception but offer valuable information for refining the instructional modules and workshops.

Time Allocation for Workshops

As noted previously, many participants highlighted the need for more time during workshops. Seven participants specifically requested longer sessions or additional workshop days to fully explore the materials and engage in collaborative activities. One respondent specifically wanted “more time to work in teams without facilitator.” Extending the duration of workshops would allow for deeper discussion, more thorough practice, and better integration of the instructional modules. One participant expressed concerns about the workshop's pace and content density, stating, "Too much information for a 2.5-hour workshop, felt lot a fire drill, unable to understand what was being presented." Another participant recommended, "Reduce the number of assignments. It's so hard to get things done because the assignments took longer than the allotted time."

More Diverse Examples

Participants expressed a desire for a wider range of examples. Including diverse and varied examples relevant to different engineering disciplines would help participants better relate to the content and apply the principles to their specific contexts. This would also cater to the diverse backgrounds of workshop attendees. One participant stated “Providing a few examples of lab topics from which to choose so we can move on quicker to practice.”

Work on Own Labs

Three participants mentioned that they wished they had brought their own labs/assignments to work on rather than starting from scratch, especially given the limited time during the workshop. “It would’ve been useful if I had my assignments on me and could improve one of those rather than work on a new one with a partner,” said one participant. This is definitely an option to consider for any future workshops or community of practice meetings.

Track-Specific Sessions

Some participants suggested offering two different tracks during workshops: one for developing assignments and assessments from scratch and another for improving existing ones. This approach would cater to the varying levels of experience and needs among participants, ensuring that both new and experienced instructors can benefit from the sessions. A participant suggested, "It would be beneficial to have two options: one for starting from scratch and another for improving an existing assignment."

Comprehensive AI Tool Integration

While the module on using AI tools for lab writing was well-received, more comprehensive training on integrating AI into lab courses could be beneficial. Detailed guidelines, case studies, and examples of AI applications in different types of lab assignments and assessments could enhance understanding and implementation.

3.5 Limitations and On-Going Effort

The workshop aimed to establish a Community of Practice (CoP) focusing on engineering lab writing education; it attracted thirty engineering lab educators. About five registrants canceled last minute or did not show. The participants' post survey revealed eleven respondents were interested in continuing their involvement with the CoP, while four were neutral. This interest emphasizes the value that participants found in the collaborative and supportive environment at the workshop. The authors remain committed to building this CoP, with plans to address areas for improvement and offer additional professional development in the near future.

4. Conclusion

A Sunday Workshop on engineering lab writing was given at the 2024 ASEE Annual Conference and Exhibitions. The workshop was designed for participants to develop engineering lab report assignments, improve engineering lab report assessment, guide students in navigating writing with generative AI (ChatGPT-4), and discuss issues with training lab teaching assistants or lab report graders. This free-of-charge professional development workshop attracted thirty educators from diverse academic disciplines, representing engineering instructors, graduate teaching

assistants, and education researchers from institutions nationwide, fostering a rich exchange of ideas and experiences. The participants' pre/post surveys provided valuable insights for refining the instructional modules with more checklists/worksheets, additional AI-related materials, and student perspectives, and improving the workshop's effectiveness by offering more time, encouraging attendees to bring their assignments to work with, and coordinating followup virtual meetings. The high demand for AI integration and ethical guidance, the versatile application of the modules, the need for continuous professional development, varying levels of initial student preparedness, and feedback on assignment load all highlight areas where this professional development workshop, and engineering writing professional development more broadly, can be further enhanced.

5. Acknowledgment

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6. References

[1] Gravé, I. (2019, June), Improving Technical Writing Skills Through Lab Reports Paper presented at 2019 ASEE Annual Conference & Exposition , Tampa, Florida. 10.18260/1-2—32951

[2] Genau, A. (2020, June), Teaching Report Writing in Undergraduate Labs Paper presented at 2020 ASEE Virtual Annual Conference Content Access, Virtual On line . 10.18260/1-2--35279

[3] Wallwey, C., & Milburn, T., & Morin, B. (2021, July), Scaffolding Technical Writing Within a First-Year Engineering Lab Experience Paper presented at 2021 ASEE Virtual Annual Conference Content Access, Virtual Conference. 10.18260/1-2--37696

[4] E. Wiebe, T. Hare, M. Carter, Y. Fahmy, R. Russell and M. Ferzli, "Supporting Lab Report Writing in an Introductory Materials Engineering Lab," in *Proceedings of the 2001 American Society for Engineering Education Annual Conference & Exposition*, Albuquerque, NM, 2001.

[5] C. Greco, J. D. Reasoner, D. Bullock, C. L. Castillo, P. S. Buford and G. G. Richards, "Efficacy of Lab Reports for Electric Circuits Laboratory Assessment," in Proceedings of the

2011 American Society of Engineering Education Annual Conference, Vancouver, British Columbia, 2011.

[6] L. Feisel and G. Peterson, "A Colloquy on Learning Objectives For Engineering Education Laboratories," in *Proceedings of the 2002 American Society for Engineering Education Annual Conference*, Montreal, Canada, 2002.

[7] J. Parkinson, "The Student Laboratory Report Genre: A Genre Analysis," *English for Specific Purposes,* vol. 45, pp. 1-13, 2017.

[8] Feisel, Lyle D., and Albert J. Rosa. "The role of the laboratory in undergraduate engineering education." Journal of engineering Education 94, no. 1 (2005): 121-130.

[9] Riley, C., Kim, D., Lulay, K. (2022) “Work in Progress: Supporting Engineering Laboratory Report Writing with Modules Targeted for Instructors,” Proceedings of 2022 ASEE Annual Conference and Exhibitions.

[10] Riley, C., Kim, D., Lulay, K., Lynch, J. (2023) “Refining Instructional Modules for Laboratory Report Writing Using a Community of Practice Approach,” Proceedings of 2023 ASEE Annual Conference and Exhibitions.

[11] Kim, D., Riley, C., Lynch, J. D., Lulay, K., St. Clair, S. (2024) “Impact of Learning Transfer-focused Lab Writing Modules to the Writing Instructional Materials by Engineering Lab Instructors” Proceedings of 2024 ASEE Annual Conference and Exhibitions.

[12] Kim D., W. Olson, K. Wandro, N. Sundararajan, O. Adesope. (2017) “Professional development workshop to promote writing transfer between first-year composition and introductory engineering laboratory courses,” Proceedings of 2017 ASEE Annual Conference and Exposition, Columbus, Ohio, June 2017.

[13] Kim, D., and Olson, W.M. (2015) “Improving student lab report writing performances in materials and manufacturing laboratory courses by implementing a rhetorical approach to writing,” Proceedings of 2015 ASEE Annual Conference and Exhibition, June 14–17, 2015, Seattle, WA.

[14] Kim, D., Sekhar, P.K. (2016) “A Preliminary Study on Supporting Writing Transfer in an Introductory Engineering Laboratory Course,” Proceedings of 2016 ASEE Annual Conference and Exhibition, New Orleans, LA, 2016.

[15] Kim, D., Riley, C., Lulay, K., Lynch, J., (2023) “Effectiveness of Transfer Focused Writing Pedagogy on Undergraduates’ Lab Report Writing in Entry-Level Engineering Laboratory Courses at Three Universities,” The Proceedings of 2023 ASEE Annual Conference and Exhibitions.

[16] Howes, F., Olson, W., Kim, D. (2024) “Investigating Engineering Undergraduates’ Writing Transfer from Two First-Year Writing-Intensive Sites to Introductory Engineering Labs,” Proceedings of 2024 ASEE Annual Conference and Exhibitions, Portland, OR.

[17] Kim, D., Lynch, J., (2020) “Perspectives and practices of undergraduate/graduate teaching assistants on writing pedagogical knowledge and lab report evaluation in engineering laboratory courses.” Proceedings of 2020 ASEE Annual Conference and Exhibitions.

[18] Kim, D., Lynch, J., Pisarchuk, P., Bryant, A., Gedlick, D., Sjolander, T. (2022) “The Status of Laboratory Education and Laboratory Report Assignment and Assessment in the Engineering Programs of a 4-Year Institution,” the Proceedings of 2022 ASEE Annual Conference and Exhibitions

[19] Kim, D., Sandry, R., Taran, A., Yurov, A., Lynch, J., (2023) “Investigating Engineering Laboratory Course Assignments and Assessments across Four Institutions and a Case Study on Their Impact on Students’ Lab Report Writing,” The Proceedings of 2023 ASEE Annual Conference and Exhibitions.

[20] Majdara, A., Olson, W., Kim, D., (2024) “A Pilot Study Inquiring into the Impact of ChatGPT on Lab Report Writing in Introductory Engineering Labs" International Journal of Technology in Education, Vol. 7(2), pp. 259-289.

[21] Kim, D., Riley, C., Lulay, K. (2019) “Preliminary investigation of undergraduate students’ zone of proximal development (ZPD) in writing lab reports in entry-level engineering laboratory courses at three universities,” Proceedings of 2019 ASEE Annual Conference and Exposition, Tampa, FL, June 2019.

[22] Kim, J., Kim, D. (2019) “How engineering students draw conclusions from lab reports and design project reports at junior-level engineering courses,” Proceedings of 2019 ASEE Annual Conference and Exposition, Tampa, FL, June 2019.

[23] Riley, C., Kim, D., Lulay, K., Lynch, J., StClair, S. (2021) “Investigating the Effect of Engineering Undergraduates’ Writing Transfer Modes on Lab Report Writing in Entry-Level Engineering Lab Courses,” Proceedings of 2021 ASEE Annual Conference and Exhibitions.

[24] StClair, S., Kim, D., Riley, C. (2021) “Undergraduates’ Perspectives on Readiness, Writing Transfer, and Effectiveness of Writing Instructions in Engineering Lab Report Writing,” Proceedings of 2021 ASEE Annual Conference and Exhibitions.

[25] Kim, D., Frye, M., Olson, W. (2021) “Multidimensional Linguistic Analysis of Multiple Undergraduate Writing Samples Collected from Engineering Students in Entry-Level Laboratory Courses at Three Universities,” Proceedings of 2021 ASEE Annual Conference and Exhibitions.

[26] Olson, W. M., Kim, D. (2022) “An Exploratory Study of Far Transfer: Understanding Writing from First-Year Composition to Engineering Writing-in-the Major Courses,” Writing Across the Disciplines, Vol. 18, Issue 3/4, 265–283.

[27] Kim, D., Howes, F. (2023) “Areas of improvement and difficulties with lab report writing in the lower-division engineering laboratory courses across three universities,” Proceedings of 2023 ASEE Annual Conference and Exhibitions.

[28] St. Clair, S., Kim, D., Riley, C. (2023) “Assessing Faculty Implementation of Laboratory Report Writing Instructional Modules,” Proceedings of 2023 ASEE Annual Conference and Exhibitions.

[29] Kim, D., Riley, C., Lynch, J., Lulay, K., St. Clair, S. (2024) “Impact of learning transfer-focused lab writing modules to the writing instructional materials by engineering lab instructors,” Proceedings of 2024 ASEE Annual Conference and Exhibitions, Portland, OR.