

From STEM to Center: Or What I Learned from Tutoring Engineers

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After working in Georgia Tech's (GT's) Communication Center for four years as a tutor and as associate director, I was hired by the H. Milton Stewart School of Industrial and Systems Engineering (ISyE) at Georgia Tech as a "Professional and Technical Communication Coordinator." The Accreditation Board for Engineering and Technology (ABET) had ruled that ISyE's students lacked strong written communication skills, and the school decided to hire an in-house specialist (as many of the other schools in GT's College of Engineering had) rather than send students to a general technical communication class.

As I settled into the job, I followed the logical steps in establishing myself. I studied models, sat in on classes, and learned as much as I could about the discipline and its jargon. Then, as Kristin Walker suggests, I interviewed professors to get a better idea of their expectations, both of what I would provide and of what the students need (3). Mostly, I worked with students and learned as I proceeded. I discovered that the students had practically no writing assignments between their first-year writing courses and the report sequence required in their Senior Design courses. Because of this, they had few opportunities to write, and I had few opportunities to work with them. Mostly, I helped them with career documents; tutored Senior Design groups as they co-wrote pre-proposals, interim reports, and final reports; and created classes, workshops, and resources tailored to the students' needs.

Now that I have become the Director of GT's Communication Center, I am able to assess how valuable that time was and would be for any writing center director focused on training tutors to better support engineering students. I have narrowed the lessons I learned down to a top three list—The Top Three Mental Readjustments I Made to My Tutoring Praxis after Working in an Engineering School.

CONSIDER ALTERNATIVE ALLIANCES.

As the lone writing specialist in a school of engineers, I felt that I

would have little trouble getting the word out that I was a resource for students. I sent out emails describing ways I could help, put up some flyers, and chatted with students and faculty around the building—all friendly-like—about my services, and while I didn't expect students to knock down my door, I figured they would trickle in. They didn't. I had made several rookie mistakes:

- Students are overwhelmed by their daily volume of email, so mine weren't on their radar.
- Students don't look at flyers (or even digital signage) anymore. It's all noise.
- Faculty didn't think to advertise my services with students. They were concerned mostly with the "hard skills" they taught, not the "soft skills" I could help with.

This last one was a doozy. I went into this thinking that faculty would be my #1 supporters. In "Go to the Writing Center," Emily Nye emphasizes the importance of "[building] alliances" with "faculty, staff and administration to bolster the idea that writing is important to your university" (15). As I struggled to get students into my office, I realized my problematic assumption. ISyE faculty, though enthusiastic about my presence and fully on board with the fact that their students needed help writing, rarely advertised for me because few of them assigned written work, so coming to see me was never going to become part of the school's culture. I needed a different alliance to get students through my door.

I had to determine a new approach. What did they need my help with? I talked to a sample of students and asked them what communication skills they thought they needed and why. I spoke with several ISyE alumni working "in industry" and asked them what communication skills they used regularly. From these conversations, I realized that students who don't spend a lot of time on communication in classes still worry about workforce communication and that those who aren't worried about that are often underprepared for the types of writing they would be expected to do in industry jobs—from client proposals to memos to professional emails. Professors agreed, citing ABET's interest in better preparing students for industry.

I changed my marketing approach, focusing on professional development as well as class projects, which led the Director of Student Services to suggest that I partner with the student professional organization she advised, the Institute of Industrial and Systems Engineers (IISE) student chapter. Since one of the chapter's goals was to help professionalize its members, this was an alliance made in heaven—the audience was already invested. They would help me advertise and invite me to do workshops at

their student meetings. I just needed to determine the workshops that would best suit their needs—from writing professional emails to communicating with clients to creating clear memos.

Nye’s advice to build alliances was golden, but for me, faculty and staff were not the best fit. I just had to keep looking until I found the right alliance. IISE, as a student-run professional organization, gave me the same “street cred” faculty might give a writing specialist in another department or center.

FOCUS ON THE WHY NOT THE WHO.

While working in ISyE, I spent most of my time helping senior design student groups with proposals and reports directed to specific clients, usually local businesses or nonprofits. Students in senior design solved real-world problems faced by those clients, and the reports were intended to explain the problem, provide a justified solution to the problem, and discuss how the solution could be implemented. Report-writing with my students was particularly challenging because they had little experience writing to a non-expert audience. When I first started in ISyE, the reports, directed to the faculty, were full of jargon, stretched between forty-five and sixty pages, were nightmarishly boring to read, and never considered the needs of the client. Students focused almost exclusively on proving technical knowledge to the faculty, but the reports generally ended up being so tedious that not even the faculty really wanted to read them.

Experts agree that engineering students need to learn to explain their ideas to those outside of their field. Reducing jargon, improving clarity, and stressing that engineering writing should be accessible to non-expert audiences is technical writing 101. Alumni agreed, emphasizing that students needed to learn these skills to communicate more effectively with clients. Within two years of getting the ISYE job, I managed to convince the faculty coordinators (and eventually the rest of the faculty) that the reports themselves needed to be client-facing—if students were only taught to explain their work to experts, how would they convince anyone outside of their field to listen to them? I thought that faculty buy-in on this idea would make all the difference. We made the change, and students . . . continued writing exactly the same way.

Even with the faculty on board, convincing the students that they needed to explain their ideas to a general audience was exceptionally difficult because the *students*, not the faculty, resisted it even when told to do otherwise. Students felt comfortable explaining their projects to experts; they believed they could focus on the details without going into the reasoning behind their project—without explaining *why* they had chosen *this* system to focus on, *this*

solution to the problems, *this* deliverable. Experts would just *get it*, right? Experts would see that these choices were the obvious (and therefore the only reasonable) path forward, *right*?

There were several ways to proceed. I started with the obvious: If your client isn't an Industrial Engineer, then would they understand why you picked this system, this solution, this deliverable, etc.? If I got a "No" here, then I could proceed, discussing audience and helping the students understand that, if the client was going to invest thousands of dollars into the solution the students were creating, they needed to understand *why* it was the "best" solution. Students also tried to dismiss the "general audience" idea outright by claiming, "We're really writing to the faculty graders, and they get it." The faculty might *get it*, but often they want to see the group's thought process. Otherwise, how do they know students are learning? The faculty would grumble amongst themselves that "students don't think about what they *should* do. They just make optimization models and simulations"—which was true. Students often chose the problems and solutions that corresponded with the processes they'd focused on in classes rather than the problems and solutions that would best help their clients.

Once students understood that the faculty wanted to understand their justification, they were more willing to explain *why* they made their choices. Luckily, one ISyE professor provided me with a good angle to take with students: *motivation*. Were the students trying to solve the problem in the cheapest way? In the quickest way? In the most sustainable way? In the way that is easiest to implement? Once they could articulate that, then they could explain how the decisions they made (which problem to solve, what solution they chose, what data to analyze, what deliverables to produce) corresponded to that motivation.

SHIFT THE NARRATIVE.

The conversation I dreaded having with senior design groups always came after they received feedback from the faculty on their midterm reports. Students would make an appointment with me and grumble: "He said we use 'we' too much." There it was. My ISyE students were consistently confused about whether to use passive voice (like other engineers do in lab reports) or active voice (which they've been told is better for client reports), so when the professor said they used "we" too much, they freaked out, convinced that they were going to have to completely rewrite the report without any self-references.

Eventually, after meeting with the faculty graders and coordinators, I discovered the whole thing was actually a misunderstanding. The faculty didn't mind that the team was referring to itself—just that it

was doing so unnecessarily . . . and way too much. “First, we looked at this data. Then we ran this data through this methodology. Then we did this math. Then we did this other math. Then we compared the first math to the second math, and we realized that we needed to do a *third math*.” And on and on. Students and faculty focused on the word “we,” but the faculty were mainly frustrated that students were going into too much detail about the processes used to analyze their data and create their deliverables. The clients wouldn’t care about the bulk of it, generally being more interested in results than in processes. The faculty, on the other hand, were reading processes that were overly obvious to them and getting annoyed about it.

The students’ confusion was inevitable. Engineering classes and study sessions spend most of their time on principles and processes, so logically students believe they need to provide the same information in their writing. Walker explains: “Using certain discourse features gives novice student writers entrance into their discipline’s discourse community” (2). Undergraduate Armand St. Pierre describes this as a common feature of students’ “engineering identity”: students want to show “that every decision is the result of careful and rational deliberation on expressible and quantifiable ideas” (63). The faculty always emphasized learning the hard skills, so in the report, students felt like they had to prove they had learned those skills by going into excessive detail. When this happened, faculty tended to complain that the reports sounded wordy – full of “fluff,” they told me. Instead of welcoming them to the discourse community, faculty just assumed students were trying to prove that they were accomplishing *something* but didn’t understand which details were important and so just talked about all of them.

I decided to try shifting the students’ narrative focus. Faculty used the word *narrative* pejoratively to describe the students’ unnecessary fixation on process; I suggested they focus the narrative elsewhere. “Stop talking about what you did,” I’d tell them, “and look instead at the story your data is telling. How can you best visualize that data? How can you use it as a call to action?” Robert Weissbach and Ruth Pflueger indicate that the presentation and analysis of the data are the key to persuading an audience (211). The students should focus on securing solid results, visualizing them, and explaining the visuals so that audiences understand their significance. This helps the client see and more easily grasp complex data analysis while cutting down on process description and wordiness.

“Show. Don’t tell.” That often helps students better understand the importance of visualization and cutting down on wordiness. But if students have a process problem, you might want to explain: *It’s*

not your story; it's your data's story.

RE-ADJUST YOUR THINKING.

Are these the only mental readjustments I had to make when I started working with engineers? Well, no, . . . it's just my top three list. Should all writing center directors take a hiatus to work in a STEM school? Of course not. But what I learned from my "hiatus" was that, despite the general misconception that traditional writing centers and their staff aren't ideal tutors for engineering students, I was actually equipped with every tool I needed to be just that. I just needed to think about my usual approaches in a different way.

With that in mind, here are some practical solutions for writing center directors and tutors working with engineering students.

1) Determine how your services can help students professionally and advertise that rather than focusing solely on classes. If you want to send out email advertisements, get help from someone in the department that students are more likely to heed. For example, I asked either the school's Director of Student Services or Senior Design Coordinator—names that students respected or feared and therefore were at least mildly willing to acknowledge—to email important documents for me. In addition, talk to career representatives, students doing internships, and alumni. Find out what services they think students need, and get examples (from exemplary stories to actual documents) that you can use in workshops.

2) Try to get students to discuss the motivation for their project and then why the group has chosen their project path (meaning why *that* problem, why *those* deliverables, why *this* methodology?). If their whys don't correspond well to their motivation, then students need to refocus on their objectives. If students are farther along in the process, tutors can change the focus to "Why is this the best path forward?"—for the group and for the client. In this scenario, the tutor's goal would be to challenge the students to define "best." Doing so should lead to conversations about justifying different aspects of the problem and should help students articulate their reasoning. If students don't understand why they need to explain/justify their choices, then tutors can ask the following:

- a. How would your audience benefit from understanding why you made the choices that you did?

- b. Why might such an explanation be helpful to both the client and the faculty?
- 3) Familiarize tutors with techniques for visualizing data. I would suggest books like *Storytelling with Data: A Data Visualization Guide for Business Professionals* by Cole Nussbaumer Knaflic and *Good Charts: The HBR Guide to Making Smarter, More Persuasive Data Visualizations* by Scott Brinatto.
- 4) Help tutors understand how narrative structure can apply both positively and negatively to [engineering/lab/technical/client/etc.] reports. Tutors should be prepared to question students about
- a. why they focus so much on process (Does your audience need to know every detail of what you did? Is that for the audience or for your professor? What does your audience need to know or see?)
 - b. how they could create visualizations (graphs, charts, illustrations, etc.) so that the audience can better understand.

Even if we're not engineers, our writing centers are still one of the best resources for students seeking help to improve their communication skills. Reading the literature on engineering communication will provide valuable insight, as will interviewing engineering students and faculty, looking at models, and better understanding technical communication and engineering identity. But in learning all that, never forget that one of the biggest issues faced by communicators, administrators, and teachers is getting stuck in our own echo chamber. So getting the perspectives of students, faculty, alumni, and workers in other fields helps to better understand how to prepare your tutors. More importantly, remember that you are already equipped with all the right tools—you just might need a little mental readjustment from time to time.



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