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BOARD # 44: WiP: Empowering TAs through Metacognitive and Communication Skills Development

Prof. Jennifer Fiegel, The University of Iowa

Dr. Jennifer Fiegel is a professor of chemical and biochemical engineering at the University of Iowa. She earned her B.S. in chemical engineering from the University of Massachusetts at Amherst and her Ph.D. in chemical and biomolecular engineering from the Johns Hopkins University. She started her faculty career at the University of Iowa in 2006. During her time at Iowa, she has built a research program focused on developing better drug delivery systems to treat infections in the lungs and on the skin. More recently, she began conducting research in engineering education with a focus on the development of engineering students as effective learners and ethical thinkers.

Charles Stanier, The University of Iowa

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WiP: Empowering TAs through Metacognitive and Communication Skills Development

Introduction

This paper presents a structured approach to teaching assistant (TA) training in a chemical engineering department at an R1 university, tailored primarily for undergraduate TAs. The initiative was conceived in the 2021-2022 academic year, when a committee of faculty and students consolidated feedback collected over the previous three years from several disparate sources to identify opportunities for program improvement. By examining the data through an access and opportunity lens, the committee sought to uncover persistent issues that had been overlooked because they never ranked as immediate priorities. Input from undergraduate and graduate TAs, undergraduate and graduate student ambassadors, and surveys from multiple undergraduate cohorts revealed a need for resources to help faculty support TAs in their courses and for TA training. At this time, neither the college nor the department offered such training.

In Fall 2022, we prioritized two key goals that could be readily addressed: 1) reducing TA frustration stemming from insufficient training, lack of documentation, the need to "reinvent the wheel" and 2) responding to the crisis in student mental health by equipping the instructional team to recognize and support students in crisis. To address these goals, we created a Teams site to centralize general and course-specific resources accessible to all TAs. We also developed a TA contract template to document roles and responsibilities, encouraging faculty to adopt it in their courses. Faculty were asked to hold weekly meetings with their TAs to discuss weekly expectations and address concerns or questions, fostering consistent communication. Additionally, TAs were required to complete the university's online Suicide Prevention Training, a program all department faculty had already completed. To gain faculty buy-in, we presented feedback data and outlined these initiatives during faculty meetings and retreats. We maintained ongoing dialogue by regularly soliciting and reporting feedback from both faculty and TAs, which allowed us to identify successful strategies and areas needing further improvement.

We also identified goals that required a more focused effort through in-person training: 1) empowering undergraduate and graduate TAs with the confidence and skills to excel in both laboratory and lecture settings, 2) reducing student frustration caused by unprepared TAs or inconsistent grading, and 3) fostering more welcoming learning environments. While a university-level TA orientation was available and piloted in Fall 2022, it primarily catered to graduate students that assumed more independent responsibilities, such as classroom management, syllabus development, content creation, and leading lectures or labs. Since approximately 90% of our TAs are undergraduate students that serve in supporting roles, most found that this training was not relevant to their needs. To address this gap, we developed and implemented a tailored TA program for our department, which is the focus of this paper.

TAs play a crucial role in education, providing instructional support to faculty while also enhancing student learning experiences. Research has shown that trained and supported undergraduate TAs contribute to improved student performance, retention, engagement, inclusion, and overall course satisfaction.[1-4] Depending on the training they receive, TAs may also strengthen their leadership and communication skills, and build self-confidence.[5-7]

However, most TAs enter their roles with little or no formal teaching experience and thus would be most successful when provided with structured training that meets the needs of the TAs and the department.[8] Despite the many benefits of TA training, time constraints are a major barrier for TAs, who often balance coursework, jobs or research, and other commitments. To address this challenge, our training program was designed to develop critical teaching and mentoring skills in a streamlined, time-efficient format while maximizing impact.

TA Training Frameworks: Self-Determination Theory and Behavior Modeling

TAs in our department typically support instructors and students through office hours and help sessions, grading, assisting in problem-solving and software training sessions, and supervising laboratory sections. Therefore, the TAs are primary contact points for students when they need help with course work. While course instructors provide guidance on how TAs perform their duties, such as setting times for help hours and providing grading guidance, the TAs maintain significant autonomy in how they provide feedback and assistance to students. This requires TAs to be both self-aware and self-motivated to achieve high-quality performance. Therefore, our approach to TA training is guided by self-determination theory, a theoretical approach to human motivation and self-regulation. Self-determination theory emphasizes people's inherent tendency toward growth and the need for their innate psychological needs to be met to achieve growth.[9] An environment that is supportive of autonomy, competence, and connection leads to enhanced self-motivation, whereas environments that thwart these three essential psychological needs yield diminished motivation. Therefore, we aimed to establish the TAs' autonomy in how they approached their duties so they could become empowered instructors, enhance their competence in critical strategies through training, and foster connections within the instructional teams through team meetings, group trainings, and community building events.

Since most of our TAs are undergraduate students, peer relationships play a central role in their positions, creating unique and sometimes challenging dynamics. These dynamics have shaped our efforts to support TA development, to foster autonomy, and to build competency across their varied responsibilities. To address these challenges, we adopted behavior modeling as our primary training approach. Rooted in social learning theory, behavior modeling is a proven method for training individuals and organizations.[10, 11] This approach is highly effective for training TAs because it provides clear, observable examples of the skills and behaviors they are expected to demonstrate. Through behavior modeling, TAs learn by observing more experienced instructors and practicing those behaviors in realistic scenarios.[12] The training process is reinforced with feedback and reflection, helping to ensure consistent application of skills in real-world teaching contexts, such as student help hours and discussion sections.

TA Training Content

Our program for TA training has evolved over time through experimentation with different approaches and topics, assessing their effectiveness, gathering participant feedback, and refining our methods (Figure 1). In its current iteration, the program includes four sessions each semester (Table 1): a 3-hour orientation at the start of the semester, a 1-hour instructional session, a 1-hour mid-semester feedback and reflection session, and an appreciation lunch for all TAs and faculty in the department. TAs are compensated for their time spent in training, whether participating in

in-person or online modules such as suicide prevention or safety training.

A mandatory three-hour TA orientation is held the day before classes begin. During this session, TAs are introduced to the professional nature of the TA role, as well as overall TA expectations and responsibilities. TAs are encouraged to communicate their needs to faculty, supported by resources such as a TA expectations contract, to enhance the TA-faculty relationship. We introduce resources available to help support TAs including the Teams site, several guides for working with students, lists of support offices on campus (e.g., counseling services, tutoring, the writing center), and online videos and trainings. TAs are given time to reflect on the role, ask questions or note concerns they have, and discuss what they are looking forward to in this role.

Our skills training begins during orientation and continues with a 1-hour session held a few weeks into the semester, after TAs have initial experience working with students or grading. These scenario-based training sessions, modeled by experienced TAs or facilitators, use real-life examples to enhance problem-solving and student interaction skills. The sessions focus on building TAs' metacognitive and communication skills. In alignment with a university-wide student success initiative, which introduces all first-year students to evidence-based strategies from cognitive science for effective learning, our TA program extends these principles to TAs. By emphasizing mindset, metacognition, and memory (the 3Ms), we equip TAs to foster a growth-oriented environment and better support student learning. TAs play a critical role in shaping the learning experience, particular through their feedback to students—both written and verbal. This feedback offers TAs a unique opportunity to observe student challenges and impact future student learning and behavior. As a result, we have prioritized TA communication skills within relevant teaching contexts to ensure they can effectively meet these responsibilities.

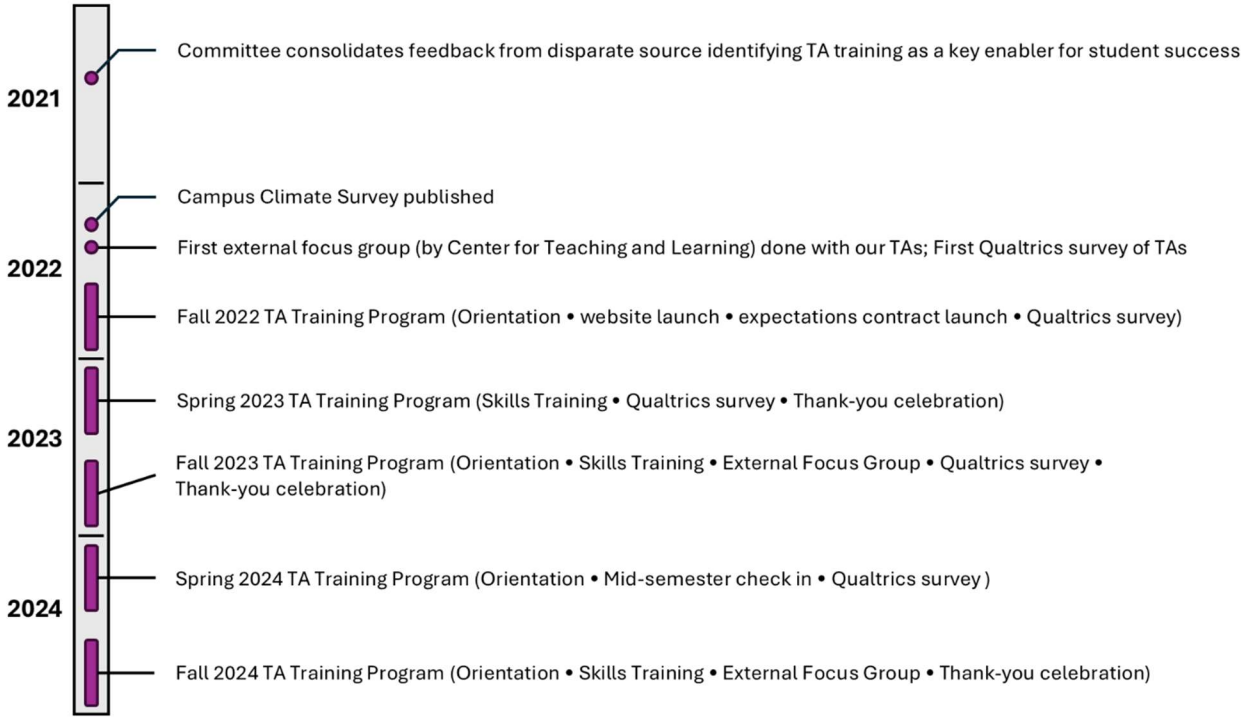

Figure 1. Timeline of TA training program development.

Metacognitive behaviors – the ability to plan, monitor, and assess your own understanding and performance – are critical for fostering student learning and helping students develop their own metacognitive skills.[13] While our TAs are typically high-performing undergraduate students who succeeded in these classes, they may struggle to articulate their learning processes, help others identify effective study strategies, or recommend evidence-based techniques for success. Modeling these behaviors is challenging for TAs,[14, 15] and even for many experienced instructors who may conflate metacognition with cognitive effort (memory).[16] During TA training, we introduce the 3Ms through short YouTube video clips and/or discussion, followed by contextual activities. Two-act plays and role-playing scenarios, focused on realistic situations TAs encounter in classrooms, student help hours, or lab settings, are used to help TAs practice mindset and metacognitive skills. For instance, senior TAs model both less desirable and more effective TA-student interactions. In the first act, a TA provides solutions with minimal student engagement; in between acts, the group discusses the impact of this approach and ways it could be changed; in the second act, the TA uses guiding questions to promote active student thinking and problem solving; following the act, the group discusses how this impacts student learning.

Table 1. Session descriptions for TA training.

Session	**Topic**	**Resources**[1]
TA Orientation (3 hours)	Ice breaker	
	Presentation – TA expectations, roles and responsibilities, resources; Reflection	Teams site, TA expectations and agreement form, list of student support resources (short list and full guide)
	Role playing scenarios by senior TAs; Discussion	'How to help students during office hours / flipped classes / labs' guide
	Mindset, metacognition, and memory (the 3Ms) in teaching and learning; Skills practice with case studies	YouTube videos, fixed versus growth mindset statements, questions to prompt metacognition
	Communication skills practice – silly product pitches, monsters in a box	
	Grading basics	Questions to ask instructor about grading
Training (1 hour)	The art of questioning; Skills practice	Questions to ask at different stages of problem solving
Mid-semester check-in (1 to 1.5 hours)	Feedback and reflection	Individual reflection sheet
Appreciation lunch	Thank you and end of semester feedback	

[1] https://drive.google.com/drive/folders/1UB99Q8te97Us6X5kdZSfMWIGYo0Kt2tT?usp=sharing

TAs then practice these skills in small groups through role playing scenarios, taking turns as the TA, the student, and the observer. These role-playing scenarios provide TAs a chance to practice the strategies in a low-stakes setting and give each other feedback on their experience in the different roles. A resource sheet with questions categorized into planning, monitoring, and evaluating stages supports TAs in guiding metacognitive processing. Afterward, participants debrief as a group, discussing their experiences asking questions of the training instructors.

Example scenarios include:

1. Parker shows up to your office hours and doesn't know where to start with a homework problem. You ask them what they have been learning in class. They say they don't know. You ask if they have notes. They say they go to lecture, but it's so confusing that they don't take notes. How would you respond? What guidance would you provide?

2. Anna is a first-year engineering student. The day after her first midterm, she confides in you that she is obviously not cut out to be a student at a 4-year college. She is surprised because academics always came easy to her. She tells you that she studied for 12 hours and felt confident going into the exam, but only received a score of 62%. What questions will you ask? What will you recommend?

Communication skills are addressed in two sessions. During orientation, TAs practice thinking on their feet, evaluating their performance, and reflecting on areas of improvement. Activities such as "silly product pitches", where TAs creatively pitch products based on random objects, or "monsters in a box", where TAs pitch ideas to peers, encourage effective communication in an engaging, low-staked environment. The second session focuses on listening and questioning skills, a widely recognized coaching technique.[17] In this exercise, the "student" presents a skill or practice they want to improve this semester, while the "TA" practices active listening, reflecting back what they hear and asking open-ended questions to guide the student toward self-discovery (without providing answers or advice). An observer monitors the interaction, and all three participants debrief afterward. Resource sheets with open-ended questions – beginning with words like "what", "how", or "tell me" - to ask at different stages of problem solving (when the student is getting started, working through the problem, reflecting on their solution, or needing clarification) help TAs structure their responses. This activity highlights the importance of balancing listening, questioning, and providing advice. While the exercise only lasts five minutes, it's a challenging practice because it requires the listener to stay focused and resist the urge to offer solutions or interrupt. Facilitators debrief with the TAs to reinforce learning and offer insights on handling different scenarios.

Mid-semester check-ins allow TAs with opportunities to reflect on their experiences, share concerns, and offer feedback for program improvement. TAs evaluate what is working, what could improve, and how they've applied training strategies in their roles, modeling metacognitive reflection. A facilitator from the Center for Teaching holds a group discussion to gather anonymous, candid feedback on the TA experience and provides a report with central themes from the conversation. A follow-up survey at the end of the semester requests feedback through a Qualtrics survey. Feedback reports are shared in faculty meetings to motivate departmental engagement and inform future training.

Impact of TA Training and Facilitator Observations

By actively seeking and incorporating feedback, the TA training program has continuously evolved to better prepare TAs to support students' academic success and well-being. Feedback has been overwhelmingly positive. Our Center for Teaching facilitator observed a significant shift in TA attitudes and comments about the TA experience, noting improvements in

communication, grading, teaching support, and interpersonal dynamics. In Fall 2024, the facilitator highlighted that the in-house training was “both useful and engaging” and that the overall TA experience has significantly improved over the years. TAs particularly appreciated activities involving behavior modeling, which they found directly applied to their roles.

We are also assessing how well the training is translating into practice. TA survey responses (Fall 2023, 87.5% response rate; Fall 2024, 50% response rate) indicate strong retention and application of the mindset and metacognition concepts. In their feedback, TAs emphasized assessing students' initial understanding before providing guidance, allowing them to tailor their support to each student’s needs rather than simply giving answers. They also highlighted the value of fostering a growth mindset, recognizing that they, too, were continuously learning alongside students. Additionally, TAs noted the significance of encouraging self-reflection and active thinking by asking conceptual questions. Some TAs specifically mentioned using metacognitive and mindset-based strategies to help students develop effective exam preparation skills.

Over time, we have observed that the TAs take their responsibilities seriously, are highly motivated, and actively engage with the training content. A notable improvement in professionalism has emerged, supported by consistent messaging that the TA role is both a teaching opportunity and professional development. This has helped counter toxic behaviors such as ego-driven competitiveness that were observed earlier in the program.

Despite these successes, challenges remain. TAs continue to request more support in grading/feedback. Addressing this area requires greater faculty engagement to clarify grading responsibilities and expectations, given the variability across the department. Future plans include creating recorded models of effective student-TA interactions, expanding our case studies to cover diverse teaching scenarios, and curating a library of engineering problems with feedback that emphasize metacognitive strategies. We will continue to gather data about the training program to assess its impact on TA confidence, teaching effectiveness, and student learning outcomes. This ongoing evaluation will help refine the training by identifying areas for improvement and ensuring alignment with both TA needs and departmental expectations.

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