

WIP: Engineering Undergraduate Teaching Assistants' Reflections on Their Job Responsibilities and the Usefulness of Organizational Support Available to Them

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Abstract

This work-in-progress research paper is part of the first phase of a project with an action research approach that seeks to integrate the needs, interests, and motivations of engineering undergraduate peer teaching assistants (PTAs) into evidence-based pedagogy training to co-create new training content that serves this PTA community directly. Pedagogical training is essential to maximizing the effectiveness of PTAs in their interactions with students. Much of the content and activities of such training are evidence-based, and literature on training programs, particularly in engineering education, typically report TAs' opinions and anecdotal feedback as assessment, but only after the program is fully developed and run. Further, many PTAs will not continue in a career in academia; therefore, their motivation to fully engage with pedagogy training is mostly intrinsic, which might suggest a need for explicit connections between pedagogical and professional skills. A TA training program hosted at a large US Midwest university is beginning this project to better align evidence-based TA training with the motivations of the PTAs in the program. In the Fall 2025 semester, an open-ended early-semester feedback survey was co-created by the TA training program manager, a TA professional development researcher, the faculty course coordinator for the first-year engineering design thinking course in which the PTAs work, and the student coordinators (Lead TAs) of the PTA team. This survey was distributed to the current PTA team, which consists of 59 PTAs, 35 of whom responded. This paper will discuss the responses gathered from the first portion of the survey, which sought to answer the following research questions: (1) How do undergraduate peer teaching assistants (PTAs) describe their job responsibilities? (2) What do PTAs find valuable in a TA Training Program to complete these responsibilities? Using an inductive thematic analysis approach, open and axial coding of these responses led to finding actions or jobs that PTAs define as within their job responsibilities and to see what and how PTAs are naming as valuable lessons or training experiences. These codes serve as preliminary findings for a codebook to be co-created with Lead TAs that will guide future research and action for program modification and evaluation. Lightning round tables are the preferred presentation environment as this will allow the authors to actively engage with other researchers working in TA and faculty development and co-create knowledge to inform pedagogical training practices in engineering.

Keywords: TA professional development, action research, motivation, community of practice

Introduction

Many factors play varying roles in a student's transition to a bachelor's degree program [1]. To provide a near-peer buffer for students, undergraduate peer teaching assistants (PTAs) can be employed in first semester and/or first-year courses [2], [3], [4]. Pedagogical training is necessary to properly prepare these PTAs for their interactions with students and to provide helpful feedback on assignments, as content knowledge is not sufficient [5]. Much of the literature on teaching assistant professional development focuses on the graduate teaching assistant population [6], [7], and these programs are positioned well to train future faculty in academia. However, according to a 2023 report by the Bureau of Labor Statistics, professionals

with engineering degrees employed in education occupations are grouped into the “Other” category, indicating a low percentage in these roles [8]. Inferring then that most undergraduate PTAs will not pursue education occupations, a shift to focusing on professional development outcomes of PTA training programs is necessary. Although some engineering PTA training programs focus on such outcomes [9], most focus on PTAs’ abilities to impact student outcomes [2], [10], [11]. As PTAs weigh what is worth their time and energy, pedagogical training programs must meet the professional development demands of undergraduate engineering students.

Professional skills that PTAs are constantly using are boundary spanning competencies, or the action of working and communicating across some difference, mostly in this case organizational and knowledge differences [12]. The researchers focus on boundary spanning because of its relevance to professionals in engineering and other fields, working across engineering disciplines and functional teams within an organization, different technical and business-minded stakeholders, and across hierarchical levels of power [13]. Boundaries that PTAs are consistently spanning include working with their students either one-on-one or in small groups, mediating conflict on student teams, collaborating with other PTAs, and coordinating with faculty and professional management. Further, students that complete co-ops or internships are experiencing and enacting boundary spanning through those rotations. Adopting boundary spanning as an outcome of the PTA program creates a throughline for engineering PTAs to explicitly see their professional growth.

This work-in-progress paper reports on the preliminary analysis of early-stage data of survey data collected from a PTA Team that worked in the Fall 2025 semester. Working with 12 undergraduate and graduate student coordinators of the PTA team – seniors PTAs and graduate teaching assistants (GTAs) that coordinate the PTA team – the survey sought to answer the following research question: *How do PTAs describe the role they play in student success?* The aim of retrieving responses to this question was to investigate how PTAs situate themselves in terms of roles and tasks within their jobs. This sought to get PTAs thinking about how they want to become better at these roles and tasks, which can then lead to further reflection on linking their development in this role to their development of boundary spanning competencies. Using an inductive thematic analysis approach, open and axial coding of these responses led to finding actions or jobs that PTAs define as within their job responsibilities and to see what and how PTAs are naming as valuable lessons or training experiences.

This survey is a part of a larger study that will involve participatory methods [14] to co-create professional development for and with PTAs, ensuring it includes necessary pedagogical outcomes, focuses on development of boundary spanning, and allows PTAs to identify personal professional development outcomes. With PTAs’ input, this project aims to maximize PTA buy-in by maximizing their outcomes, which the researchers hope to translate to positive interactions and outcomes with students served by the PTAs.

Methods

The training program must integrate boundary spanning competencies with the needs, interests, and motivations of PTAs. From literature, we trust that PTAs are willing to engage with this

training content because of their care for the student experience [15], and we leverage this along with our goal to professionally develop the TAs themselves as our jumping off point to getting PTAs to buy into the study. To begin identifying these factors, an open-ended survey was administered to a team of 59 PTAs employed by a large Midwest university. These PTAs work primarily inside flipped classrooms in the first-year engineering design thinking course sequence. Weekly, PTAs meet in person to receive lecture and reflection-based pedagogy training, adapted from the learning assistant training model [16]. To draft the survey prompts, the research team involved the student coordinator team as an introduction to using participatory approaches, as there was confidence that the senior PTAs could provide strong input into the wording of questions to accurately measure PTAs' interpretations of their roles. Led by a professional staff manager, a brainstorming session with the student coordinator team was done with the prompt, "What feedback do we want to collect at this stage of the semester?" From this exercise, the research team collaborated to build the survey with both researcher and student coordinator interests in mind, following guidelines of participatory methods.

The survey was administered twice – once early in the semester between weeks three and five, and once late in the semester between weeks 13 and 15. The researchers looked for general change in themes to get a sense of team-level changes in opinion across the semester. Only data from responses that were released for research and that fully answered prompts were included – blank responses were omitted. Of the 59 employed TAs, 45 responded to the early semester survey, with 28 responses fitting these criteria. Only 8 responses were collected from the late semester survey, and this data has not yet been sanitized for inclusion in the study. Open coding has begun on the 28 responses to the early semester.

Participant Confidentiality

The data for this study was collected in line with ethical guidelines for conducting human-subjects research and research procedures approved by the University of Cincinnati's Institutional Review Board including informed consent and maintaining participant confidentiality and prevention of potential harm. As previously alluded to, the researchers on the project work have power over the PTAs' employment, so it is important that the research team administers tools that provide a sense of safety to more organically get PTAs discussing what PTAs want to discuss, rather than leading PTAs to provide responses that they think the management team wants to hear. To protect PTAs' perception of threat to their employment, the survey was administered completely anonymously through Qualtrics. Response ID numbers were used to keep track of data from the same respondent. In addition, PTAs were asked to omit names of co-workers and faculty to ensure their identities could not be triangulated. While this prevents the researchers from seeing evolution of specific PTA responses over time, it ensures that PTAs feel safe providing honest and genuine responses. Finally, these surveys were conducted during in-person meetings. Once the survey had been introduced, the professional management team left the room and dismissed the PTAs, encouraging them to finish the survey during our meeting time but allowing them to leave and complete it on their own time.

Results and Discussion

At this stage of the project, eight codes have emerged to describe how PTAs perceive and report their role and duties – they are described in Table 1. Many responses (n = 19) spoke to specific academic tasks that PTAs fulfill, such as grading, answering student questions, and assisting their professors. These more surface-level responses begin to paint the picture that PTAs are considering the official responsibilities outlined in their offer letters. Further, these responses may suggest PTAs are thinking about more knowledge-based boundary spanning competencies opposed to organizational.

Table 1. First Round of Open Coding of PTAs' Descriptions of their Roles and Duties

Code	Code Description	Supporting Quote
environment safe for learning	TAs are to build environments that promote both psychological safety and learning among their students	"To help create a safe, fun, and productive environment"
academic task-oriented	answer questions, grade assignments, and assist professors	"My duties are to respond to student questions, grade submissions, and help the professors with whatever they need."
transition students	TAs are to help students transition to their engineering program	"Helping students transition into engineering by helping answer questions and provide assistance in class, tutoring hours, office hours, etc."
build relationships	TAs are to make connections with students	"To connect with students and provide them with help and guidance through their coursework."
facilitating learning	TAs support student learning	"My responsibilities as a TA is to ensure that students grasp topics and are learning correctly from their lectures and continuously. Additionally, I am responsible for supporting engagement across the class."
instill confidence	boost student confidence	"make the student feel more confident in his/her class"
managing TAs	Lead TAs manage other TAs	"For a Lead TA or GTA, in addition to the previous items, checking in on the well-being of the TAs, ensuring proper recordkeeping (ex. timesheets, class attendance, reminders), setting an example for fellow TAs (ex. showing up early to class, being attentive to the professor's lecture, engaging with students to build a positive classroom culture), etc."
liaison student to professor	TAs should bridge student questions and concerns to the professor	"My primary responsibility as a TA is to be the bridge between students and the instructor. I am also responsible for grading assignments, proctoring exams, and answering questions from students."

Other responses framed these tasks under broader constructs, such as helping students transition to an engineering degree program, creating and fostering psychological safety in the classroom, and building relationships with students. This may suggest more organizational-based boundary spanning activities that management observes PTAs doing – PTAs are responding with *how* they go about helping students opposed to simply having the correct answer to their question. The wide range of approaches also speaks to the range of professional development topics that must be covered to ensure PTAs can fulfill these roles confidently, further emphasizing the need for PTA input on their training.

PTAs are also naming organizational boundaries most often from others, namely how they situate themselves in the classroom in relation to faculty instructors, other TAs, and their students. In the *liaison student to professor* code, one PTA identifies themselves as "the bridge between students and the instructor". A 2022 study [17] discusses the unique extension of

learner, peer, and instructor in which learning assistants (LAs) find themselves in classrooms. We want to explore an extension of this position with PTAs in relation to the teams and organizations they work in on co-op and early in their engineering career. Richer contexts may exist within individual PTA experiences that explore hierarchies and team dynamics within their classrooms, and an exploration of how PTAs use these experiences to span boundaries in their early engineering careers can provide insight into evolutions of training modules to establish this outcome of the TA training program.

Future Work

This initial round of open coding was completed by one researcher on the project. Future analysis will include adding other researchers to the coding process, including at least one subject-area expert and one undergraduate student coordinator on the PTA team. From here, steps can be taken towards intercoder reliability, and the undergraduate student coordinator will provide one level of member checking. For an additional level of member checking, the current codes will be discussed with a different student coordinator as well as a PTA not part of the coordination team.

Further rounds of coding using the framework of boundary spanning competencies [12] is also necessary to formally ground PTA responses. This grounding will aid the researchers and student coordination team identify specific competencies to then develop new or modify current training modules with this outcome in mind.

Another dimension of the PTA team that should be explored is the number of semesters on the PTA team – new hires, first-time returners, and second time and more returners – will suggest if some of the nuance to PTA responses comes with more experience on the PTA team. It might be the case that new PTAs are simply surviving their first semester in their role, getting oriented to being on the other side of the classroom, while returners have the capacity to think more critically about how their interactions with students impact student confidence and self-efficacy in solving engineering course exercises.

Implications for faculty at this stage are limited, as we are exploring what PTAs think they should be doing and the boundary spanning actions they are taking to do so. However, future work will include investigations into the specific boundary between faculty and PTAs.

Conclusion

The survey data captured and analyzed in this work-in-progress study helps researchers, managers, and student coordinators position where to start co-creating or co-tuning training content, where boundary spanning competencies may most resonate with PTAs, and what other professional skills PTAs are interested in developing. More in-depth analysis of this data as well as continued coordination with the student coordinator team is necessary. Further, making the explicit connection of PTA work to boundary spanning and professional skills through these responses will aim to boost PTA buy in for pedagogy training. Continued work on this project will provide a framework on how to co-create training with PTA teams to better align training outcomes with PTA interests.

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