

PAPER

Exploring the Role of Course Teams in Helping Graduate Teaching Assistants Navigate Day-to-Day Teaching

Ashish Agrawal()

College of Engineering
Technology, Rochester
Institute of Technology,
Rochester, NY, USA

atacet@rit.edu**ABSTRACT**

Graduate teaching assistants (GTAs) significantly contribute to undergraduate education at US universities, particularly in engineering. As novice teachers, they require adequate pedagogical training. This training mostly relies on a few pedagogy-focused workshops or courses taken by all teaching assistants at a university and faculty and peer mentoring. However, GTAs still need relevant course- and context-dependent pedagogical support. Recognizing the importance of such assistance, this study explores the support provided by course teams, comprising the instructor(s) and teaching assistants, to GTAs in navigating day-to-day teaching. Data were collected over a semester-long period in the form of periodic interviews and weekly reflections from seven GTAs teaching different engineering courses at a large US university. Findings suggest that regular interactions with course teams help GTAs participate in a community of practice. This experience helps them more effectively fulfill their day-to-day teaching responsibilities related to course preparation and delivery, and manage teaching tasks alongside other professional and personal responsibilities. Moreover, as GTAs navigate these responsibilities with the help of course teams, they also learn valuable academic skills required of future faculty.

KEYWORDS

graduate teaching assistants (GTAs), navigation of teaching responsibilities, situative learning

1 INTRODUCTION AND BACKGROUND

Graduate teaching assistants (GTAs) form an important and integral component of undergraduate teaching in the United States and globally. They assist the course instructors in carrying out a variety of functions, including assisting students during lab experiments, grading student work, serving as recitation leaders, proctoring exams and tests, and holding office hours to address student queries. Additionally, at times, they also prepare instructional materials and teach introductory courses as “Instructors of Record.”

Since GTAs do not generally have prior teaching experience, they need to be trained in aspects of teaching, including knowledge of their role, instructional

Agrawal, A. (2025). Exploring the Role of Course Teams in Helping Graduate Teaching Assistants Navigate Day-to-Day Teaching. *International Journal of Engineering Pedagogy (iJEP)*, 15(2), pp. 106–121. <https://doi.org/10.3991/ijep.v15i2.51677>

Article submitted 2024-08-09. Revision uploaded 2024-11-15. Final acceptance 2024-11-29.

© 2025 by the authors of this article. Published under CC-BY.

skills as they relate to their specific academic disciplines, and classroom management practices [1]. To this end, training programs and workshops are designed at universities to help GTAs develop these professional competencies, which are the commonly used methods for the development of both faculty and graduate teaching assistants [2], [3], [4], [5].

However, there exists a wide variation in the teaching assistant¹ (TA) training and professional development programs that are offered at different universities. In a review of TA professional development programs, Parker et al. [6] found that these programs range from being single-session programs to those that are delivered over a day or two to those that run throughout a semester. Depending on the institution and the nature of the program, these trainings can be voluntary or mandatory. Regardless of how these programs are offered, they generally are in the form of workshops, sessions, or pedagogical courses [7].

While evaluating the extent to which the level of effectiveness of training programs for GTAs is beyond the scope of this paper, there exists one major issue with these programs. Most training programs that are based on workshops, sessions, or courses assume that once GTAs acquire the required content knowledge and pedagogical skills through training, they will be able to transfer these to their teaching. Boud and Brew challenge this assumption by highlighting that teaching, especially at the post-secondary level, incorporates “elements of both structure and action” [8, p. 82]. Here, the structure includes the teaching materials, social and disciplinary contexts, and course-specific requirements, and action relates to what teachers do in the classrooms. Hence, to be able to effectively teach, GTAs require continual mentoring and feedback [6], [9] embedded in the context of teaching [10].

As a result, some universities have implemented TA development programs that involve faculty and peer mentoring [1], [6], [11]. However, the extent to which these mentoring programs can help TAs navigate everyday course- and context-specific teaching concerns remains uncertain. On the contrary, some studies (e.g., [12], [13]) highlight the lack of adequate support received by teaching assistants in navigating their everyday teaching. Another issue that makes navigating day-to-day teaching difficult for GTAs is that they need to focus on research to fulfill their educational requirements, and teaching responsibilities may sometimes impede their research progress [14].

It can be argued that GTAs’ everyday teaching experiences are very course- and context-dependent, and addressing them requires closely working with the course instructor and other teaching assistants in the course. That is why scholars have called for “ongoing instructional support” [15, p. 65] and opportunities to have “both formal and informal discussions and meetings to discuss pedagogy and course design with Course Instructors and other TAs” [16, p. 4]. Building on this thought, this study seeks to explore the role of course teams in helping GTAs navigate their day-to-day teaching responsibilities. For this paper, I define day-to-day teaching responsibilities as those tasks that GTAs need to complete as part of their responsibilities, such as preparation and delivery of the course content, supporting student learning, and fulfilling other teaching responsibilities, including grading student work and addressing student queries while simultaneously managing the dual responsibilities of a teacher and a graduate student. Specifically, the study addresses the following question:

How does support from the course team help GTAs navigate their day-to-day teaching responsibilities?

Here, course team refers to the group consisting of the course instructor(s), the GTA, and other teaching assistants, if any, in the course.

¹ Teaching assistants can be both graduate and undergraduate students.

2 THEORETICAL FRAMEWORK: SITUATIVE PERSPECTIVE ON LEARNING

To address the research question, I used the situative perspective on learning as the guiding framework. According to this framework, knowledge is “distributed among people and their environments, including objects, artifacts, tools, books, and the communities of which they are a part” [17, p. 17]. In this perspective, learning happens through meaningful participation in a community of practice.

Thus, the situative perspective on learning is similar to the idea of social constructivism, which emphasizes the role of social interactions in learning [18]. This approach to learning has received considerable attention from educators in current times [19]. In the context of GTA and faculty development, several scholars have highlighted the role of interactions and forming a community of practice [20], [21], [22], [23]. Hence, the situative learning perspective provides an appropriate framework for addressing the research question.

3 METHODS

Data for this study were collected as part of a larger project that aimed to understand the experiences of international GTAs in US engineering classrooms [24]. Based on the data, I found that the interaction with the course teams played a very significant role in helping participants navigate the various aspects of their day-to-day teaching, thus providing the motivation for this paper. As the findings in this paper relate to succeeding in day-to-day teaching responsibilities as opposed to navigating linguistic and cultural differences, these findings are applicable to all GTAs, domestic and international, as they fulfill similar teaching tasks on a day-to-day basis. The study was approved by the Institutional Review Board at the research site.

3.1 Research context

The study was conducted at a large mid-Atlantic public university in the US. According to the Carnegie Classification of Institutes of Higher Education, this university is classified as a “Highest Research” or R1 university [25].

3.2 Participants

Participants for this study were seven GTAs. Potential participants were invited to participate in the study through emails, flyers, in-person conversations, and snowball sampling. Interested individuals filled out a Google Form that collected their demographic information, current teaching assignment, and prior teaching experiences. Based on the provided information, ten were invited to participate. Three out of these ten dropped out in the middle of the study, citing personal reasons, and the remaining seven completed the study.

These seven GTAs represented diversity in terms of their self-identified gender, including five males and two females, and their national origins, including participants from China, Egypt, India, and Iran. Additionally, there were variations among participants in terms of the level of courses they taught, their teaching responsibilities, prior teaching experiences with the same or different courses, and the

composition of course teams. The exact composition of the course teams varied for each participant. The study protocol did not capture the exact compositions of course teams.

The variations in participants' demographics and teaching responsibilities capture the diversity in their experiences. These variations are presented in detail in Table 1. Table 2 represents a description of each teaching responsibility noted in Table 1.

Table 1. Participants' prior teaching experiences and teaching responsibilities

GTA ID	Teaching Responsibilities	Level of Class Teaching	Prior TA Experience with the Same Class	Other TAs in the Course
P1	Instructing lab, Grading	Junior	No	Yes
P2 [^]	Grading, Holding office hours	Junior	Yes (taught the class previously as the course instructor)	Yes
P3	Grading, Holding office hours	Senior	No	No
P4	Holding office hours	Sophomore	No	Yes
P5	Grading, Holding office hours	Sophomore	No	Yes
P6*	A. Making assignments, Grading B. Holding office hours, Instructing lab	A. Junior B. Sophomore	A. Yes B. No	A. Yes B. Yes
P7	Grading, Holding office hours	Junior	Yes	No

Notes: [^]Participant was a 10-hr GTA for a graduate course and a 10-hr GTA for an undergraduate course; the study focused on the experiences in the undergraduate course. *Participant was a GTA for two undergraduate courses; the details about the two courses are presented as "A" and "B."

Table 2. Description of participants' teaching responsibilities

Teaching Responsibility	Description
Instructing lab	Helping students complete experiments in the laboratory
Grading	Checking student work for correctness and assigning grades
Holding office hours	Meeting with students during scheduled times to help them with completing assignments
Making assignments	Creating assignments to be given to students to practice the material taught in the course

3.3 Data collection

Data were collected over a semester-long period. A semester at the research site typically lasts for approximately sixteen weeks, including teaching and exam times. The methods of data collection included periodic semi-structured interviews and weekly reflections completed by participants. The interviews lasted for approximately 30–60 minutes each and were done at three critical stages of the semester. Additionally, participants were asked to complete the weekly reflections starting the second week of the semester to the end; thus, each participant was asked to complete fifteen weekly reflections in total.

The first interview was done in the second week of the semester and aimed at collecting the background information about the participants, including their formative educational experiences, exposure to English, length of stay in the US, and prior

teaching experiences in the US. During this interview, participants were also asked about their familiarity with, and preparedness for, the course they were teaching and the support provided to them by the course instructor, the engineering department, and the university to prepare them for teaching. The second interview was done at two-thirds of the semester (10th–12th weeks) and aimed at giving the participants an opportunity to reflect on their ongoing experiences while they were still fresh in their memories. Participants were asked questions about their significant teaching experiences and navigational strategies in the first half of the semester during this interview. The third and final interview was conducted at the start of the next semester and aimed at allowing participants to reflect on their entire teaching during the past semester, with an emphasis on their significant experiences in the second half of the semester. During this interview, participants were asked questions about their teaching experiences, navigational strategies, suggestions for improving the future offerings of the course, and recommendations for future graduate teaching assistants.

Weekly reflections were aimed to collect participants' day-to-day teaching experiences on a more regular basis. Each week, starting the second week in the semester to the end of the semester, participants were emailed reflection prompts to be returned by them in reply to the sent email. Clarification questions were asked based on participants' responses, if needed. The prompt for each week asked participants to reflect on the week's most significant, most rewarding, or most challenging teaching experience, the navigational strategy they adopted, any support they used to navigate the experience, and their learning as a teacher due to that experience. Besides capturing participants' experiences on a regular basis, weekly reflections were also used to develop probes for the second and the third interviews.

3.4 Data analysis

Data analysis followed a two-step process. The first step of data analysis involved identifying instances from weekly reflections and interviews collected from GTAs in which they had noted getting support from course team members to complete their teaching responsibilities or expressed difficulties in effectively completing their teaching tasks due to a lack of interaction with or support from the course team members. Here the support that GTAs got could be through formal scheduled meetings, email conversations, or informal interactions in labs, classrooms, or office hours. The second step of the analysis involved a thematic analysis of the teaching responsibilities identified in the first step, guided by Miles et al. [26], to create categories and subcategories of teaching responsibilities that GTAs completed with the support of their course teams.

4 FINDINGS

Based on the analysis, I found that the support from the course team helps GTAs navigate their various teaching responsibilities that can be grouped into three categories: course preparation, course delivery, and workload management. In the following sections, I discuss how the course teams helped GTAs navigate their teaching responsibilities within each category. Example quotes taken verbatim from the weekly reflections and interview transcripts are presented to depict participants' written or spoken words rather than grammatically- and syntactically-correct academic English. Note that I have used the gender-neutral pronouns 'they,' 'them,' and 'their' to refer to the participants to preserve their anonymity.

4.1 Course preparation

Course preparation tasks constituted one of the most significant parts of participants' teaching assistantship and appeared very frequently in the weekly reflections. Several participants in the study relied on the course teams for preparing for the courses they taught. Course preparation took two forms: 1) learning or re-learning of course material and 2) managing the logistics of effectively delivering the course content.

Learning or re-learning of course material. Participants noted spending considerable time and effort in learning or re-learning the course material to be ready to teach. The time spent learning or re-learning the course material was particularly significant if the GTA was teaching a course in which they did not have expertise. Support from the course instructor(s) and fellow teaching assistants proved quite useful for the GTAs in learning or re-learning the course material. Talking about the support provided by the course team, one participant noted:

For the supervisor of the class... he wrote and give us some basic introduction of each lab. He wrote and draw the basic circuits schematics and briefly talk[ed] about the things that we need to design in the lab before the lab, and some common mistakes that we may encounters during the lab. At the same time, he taught us how to use the lab equipments and how to solve some practical issues. (P1, Interview 3)

My partner, who is another TA teaching the lab, and I spend a large amount of time on it. We read a lot and reorganize the knowledge of this course... If I encounter some difficulties, I will try to figure it out by myself. I can read books and do some searching online. If it does not work, I will talk with my partner and try to solve this problem together. (P1, Weekly Reflection 1)

In the first quote, the GTA described the help from the course instructor to learn the lab procedures and ways to address issues that arise (e.g., equipment errors) while conducting the lab experiments. In the second quote, the participant noted how they relied on a fellow TA teaching the same course to understand the course content, especially when the participant could not understand the course material on their own. Similarly, another participant described how they sought the help of a fellow TA to prepare themselves for office hours by learning how to solve the problems in an assignment that was due soon.

The office hours are more—it's very assignments-specific. If there's a deadline for the assignment, then I tend to look at the assignments—the questions and formulate answers. If I don't know or [I am] having a doubt [difficulty] with one of the questions, then I ask the TA who has been a TA in this course for the last four semesters. I tend to ask [them] about the answer. (P5, Interview 2)

While these participants got direct help from the course team in learning the course material, this support was provided in an indirect manner for another participant who noted:

I just see this week we're going to... which sections we're going to cover and read that in the textbook and then start solving the homework. Usually, the professor sends us Excel sheet solutions of the homework and the book's solution manual as well. I just solve them by myself first and then compare my answers to the book solutions, and that's essentially it. (P4, Interview 2)

In this example, the participant described how they prepared for office hours by learning the course material from the textbook and solving the homework problems. The course instructor usually helped in this process by sending the solutions to the homework problems, which the participant used to check their own solutions, thus ensuring that they have correctly learned how to solve the homework problems.

Managing the logistics of effectively delivering the course content. The second aspect of course preparation in which participants noted getting support from the course team included managing the logistics of effectively delivering the course content to students. Managing the course logistics included preparing and modifying course slides, designing the lecture or lab content, and preparing materials to assess student learning including tests, quizzes, and rubrics. For example, one GTA noted collaborating with the two other teaching assistants in the course to design a continually evolving rubric to grade student work:

It's typically in that [common available time] slot where we decide that these are the steps that [we] will see, and this is how [we] will grade. These are the deductions. We make our text file kind of stuff where we write all the deductions [...] so that everyone has the same justification, everyone has the same deductions... The rubric that we get from the instructors is also fairly intensive; they have all the reductions and everything. If we feel like there's something extra, then we make that text file where we write all the deductions that we want to make, then we share it among us, like all three of us. (P5, Interview 2)

As discussed in this quote, the three teaching assistants in the course met and documented how to deduct points for the mistakes done by students so that there is consistency among the three graders. The participant further added that if either of them came up with additional modifications to the grading scheme while grading, they would post it on a group chat created for the three TAs so that others could also implement those modifications in grading.

For another participant, preparing for different aspects of instruction such as designing lab experiments and mid-term tests was a team affair that was executed through regular team meetings. For example:

In the last lab, a majority of students struggled with [the] basics and couldn't finish the lab. [So] we decreased the difficulty level of this lab compared to the previous lab... Our instructors along with the four TAs [including me] designed this lab assignment based on the student performance and the feedback we got. (P6, Weekly Reflection 2)

In this quote, the participant discussed the process of collaboratively designing a lab assignment based on student performance.

4.2 Course delivery

Graduate teaching assistants got support from their course teams not only to prepare the course content but also to deliver it. Moreover, like course preparation, experiences related to course delivery appeared in the weekly reflections during several weeks. These course delivery tasks fell into two groups: 1) instruction and 2) course maintenance.

Instruction. Instructional tasks refer to those that help students learn the course material, complete assignments or lab procedures, or better understand the assessment requirements. Participants who had to instruct labs heavily relied on their course teams for completing these instructional tasks. For example, one participant described the help they received in improving their instructional approach when a fellow TA teaching a different section of the same lab course shared their lecturing experiences:

In the lab 1, most people were not able to finish their experiment on time. After another week's training, they are able to improve their hands-on ability and make good progress. I think that is partly because of the effective lecture provided by me... I did some reflections after the first lab and then try to make some improvements on the class experiment... Sometimes, I talk with another TA who is in charge of the same class. It helps after the sharing of lecture experiences. (P1, Weekly Reflection 4)

In another weekly reflection, this participant also noted getting “tips” from the course instructor to help students effectively complete the lab experiments.

Another GTA who was teaching a lab course noted that the discussions with the course team in the weekly meetings helped them identify appropriate teaching strategies for each week. As the participant recounted in one weekly reflection:

Last week again I managed to finish the lab on time (almost) which was a big deal considering the difficulty level... I actually took a different approach than the other labs this time. Instead of helping the students individually, I actually tried to explain everything on the board in such a way that I didn't need to help them individually... One of the instructors was there for the lab and we also discussed this approach in our weekly Monday meeting. (P6, Weekly Reflection 14)

Not only did the GTA use a strategy discussed in the weekly meeting to deliver instruction on a relatively difficult topic, but also a course instructor was present to help the GTA during instruction, if needed. In the final interview, this participant called their teaching experience a “collaborative thing” as the course instructors and the course TAs discussed the content and teaching strategies for the following week during their weekly meetings. During these meetings, the course team deliberated on the teaching experiences that the TAs had during the past week and then collaboratively made future teaching plans based on the past week’s experiences. Similarly, another participant (P7) noted getting continual support from the course instructor in the form of in-person and online interactions to respond to students’ queries and concerns about homework problems.

While collaboration and regular interactions with the course team helped participants perform their instructional responsibilities, an absence of it possibly hindered student learning. Because of a lack of interaction with the course instructor, one GTA could not convey the student feedback they formally or informally gathered during the office hours to the instructor. The participant reflected:

One of the thing[s] is [that] someone wrote in the answer [to a homework problem] that “I don't think the class has prepared me to answer this question” as the answer. [On probing if the GTA told the course instructor about this comment] I myself couldn't tell him because it might be a reflection on his teaching or

something. It seemed like a comment I can't tell him unless he realizes on his own.
(P3, Interview 2)

As the interaction of this GTA with the course instructor was mostly limited to collecting ungraded homework and returning it after grading, they did not feel comfortable letting the instructor know of the struggles faced by students. This feedback to the instructor could have motivated the instructor to change their teaching to better support student learning. However, this opportunity was lost due to a lack of regular interaction between the course instructor and the participant.

Course maintenance. Besides the delivery of instruction, participants' teaching responsibilities also included tasks related to course maintenance. Course maintenance refers to tasks that do not directly support student learning or help them understand the course requirements; rather, these tasks support student learning in an indirect way. These tasks include grading student work, addressing students' questions or concerns about their grades, and following up with students who are not performing well. Two participants (P5 and P6), whose responsibilities included grading noted the help they received from the fellow TAs in understanding the grading requirements. For example, one participant noted:

This week most of my TA duties involved grading Assignment 1. The biggest challenge was grading 47 groups of assignments... The grading covered many manuscripts... A [fellow TA] in this course has been in this course since Fall 2015. She helped me in understanding what the instructor wants in the graded files.
(P5, Weekly Reflection 3)

It should be noted that this participant had also received support from the fellow TAs in preparing the grading schemes as discussed earlier. Another participant (P7) also noted seeking and getting support from the course instructor in handling late assignment submissions from students, efficiently grading student work, and addressing student requests to review their homework and course grades. For example:

The most significant experience of this week was dealing with the late-submission assignments and set a fair penalty for accepting the late submissions... My policy is to not to take any action without the instructor authorization. So, I discussed the issue with instructor and we made a penalty for the late submissions. (P7, Weekly Reflection 1)

As discussed in this excerpt, the GTA usually consulted the course instructor before taking any major course decision, which also suggests that the instructor was readily available for consultation and advice on various aspects of teaching. This availability of the course instructor to help the participant was further confirmed by them in other weekly reflections and follow-up interviews.

While regular interactions with course teams helped participants with various course maintenance tasks, a lack of such interaction with the course instructor, at times, led to delays in responding to student queries if the GTA needed the instructor's advice to respond to a particular query. As one participant noted:

We didn't meet usually. We just send [an] email if there are some questions we need to solve... there should be more communication or meeting with the instructor... Sometimes the students may ask questions on their re-grading for one

question... I need to ask for the instructor's suggestion [on] whether I could or not. If I can communicate with her directly to talk about it, maybe it will be much more efficient to solve this kind of problem. If I just send [an] email, it may take time to get the feedback from the instructor. (P2, Interview 3)

In this instance, the participant described a relative lack of communication with the course instructor and how it hindered their ability to promptly respond to student questions. The participant noted that because they did not have regular meetings with the instructor, they needed to send an email to the instructor to seek the instructor's opinion in cases such as re-grading a student's assignment and modifying the grade. As it sometimes took the instructor longer to respond to the GTA's email, the GTA took longer to respond to the student, eventually leading to a longer time gap between the student's query and the GTA's response. The GTA further suggested that this situation can be improved with more opportunities for interaction with the instructor.

4.3 Workload management

Besides serving as teaching assistants, GTAs also have additional professional responsibilities of being a graduate student and a researcher and personal responsibilities toward their family and friends. Workload management refers to simultaneously managing these professional and personal responsibilities with teaching assistantship. Although these responsibilities do not directly form a part of GTAs' teaching and appeared only occasionally in the weekly reflections, these requirements still compete for their time and hence influence their everyday teaching. Several GTAs in this study discussed the support provided by their course instructor and fellow teaching assistants to manage their teaching workload along with other responsibilities. This support was in two forms: 1) sharing teaching workload and 2) accommodating the travel needs.

Sharing teaching workload. A teaching assistant is expected to spend a certain number of hours, as specified in their contract, on fulfilling teaching responsibilities. However, as typical of teaching, the amount of time needed to effectively complete the various teaching tasks varies throughout a semester. Generally, periods close to tests and exams, or an assignment submission deadline, require more time than others. During these periods, several students seek the help of TAs. And after a test or an exam or the submission of an assignment, there is a need for grading student work within a reasonable time. In such situations, some GTAs noted that their course instructors shared their teaching responsibilities, thus easing their workload. For example, one GTA reflected:

I have to give him the report that I spent that much time on the TA responsibilities. I spent that much time to run the research. For most of the time, he was into the process. He knew, "Okay, I don't want you to spend that much time on that part and the TA responsibility; I can take care [of] some part of it myself." He took care of most of the question that students asked in the [online] forum, so I didn't have to go through that. (P7, Interview 3)

As described in this quote, the course instructor shared some of the participant's teaching responsibilities by himself answering student questions on the online course forum after learning that the participant was spending too much time on teaching, which was adversely impacting their research. It is important to note here that the course instructor was also the GTA's research supervisor and hence was a stakeholder in their research.

Such support from the course instructors was particularly significant near the end of the semester when the participants had to promptly finish grading so that the grades could be timely submitted to the University Registrar. For example, one participant noted in the last weekly reflection:

We are 3 [TAs] in the course, and all grading needed to be completed in a closed room. The final exam had 10 questions, and most were lengthy answers. It was mostly theoretical, and the answers had to be read completely in order to search for keywords... The 2 instructors helped us in completion of the grading process in the process described above so that there were 5 graders instead of 3. (P5, Weekly Reflection 15)

In this example, the participant described the support from the course instructors in grading the final exam before the grade submission deadline. The participant noted that the course instructors and the other TAs in the course divided the grading work among themselves, which helped the participant and the other TAs timely complete grading.

Accommodating the travel needs. The course teams also helped participants by accommodating their professional or personal travel needs. For example, one participant reflected on the support they got from the course team when they had to travel out of town to attend a conference:

The week before [a conference], ... even one month before, I would tell the instructor of this course that "See, I have this and this conference. I wouldn't be able to do the whole 10 [office] hours because of this." So, he would be like, "Okay, just adjust these hours or ask your other TAs to help you out with the hours." That worked out fine. (P5, Interview 3)

In this example, the participant described how both the course instructor and the fellow TAs helped them manage their office hours during conference travels. The course instructor allowed the participant to move some office hours to a different week. At the same time, the fellow TAs substituted for the participant during their scheduled office hours.

Similarly, another participant noted that the course instructor and the fellow TAs supported their travel needs by allowing them extra time to complete grading when they had to travel outside the US to attend a family event:

[Last week] I had to leave for [home country] on [a date during the semester] because of my brother's wedding which is why I wasn't on campus when the assignments had to be graded... [So] I emailed the other TA to finish his part of the grading first and send me his rubric so that we can have consistent grading of the assignments. The other TA and [the professor] both were really helpful in giving me extra time for grading. (P6, Weekly Reflection 15)

4.4 Summary of the support received by GTAs from course teams

As discussed above, course teams, which comprised the course instructor(s), the GTA, and other course TAs, significantly helped GTAs navigate their everyday teaching experiences. The support received by GTAs from their course teams can be grouped into three broad areas: preparing for the course, delivering the course material, and managing teaching tasks with other professional and personal responsibilities. It

should be noted that while each participant was a part of a course team, it was the level of engagement with the team members that determined how much support the participant received from their course team. A high engagement with the course team involved regular interactions between the GTA and other members of the team about different aspects of teaching the course, whereas a low engagement denoted minimal to no interaction with the course team. As discussed above, a high engagement with the course team provided continual support to a GTA to help them navigate their various teaching responsibilities. Table 3 summarizes participants' level of engagement with their course teams and how it influenced their day-to-day teaching.

Table 3. Engagement level of GTAs with course teams and its influence on navigation of day-to-day teaching

<i>GTA ID</i>	<i>Level of Engagement with Course Team</i>	<i>Major Teaching Responsibilities</i>	<i>Influence of the Course Team on Participants' Day-to-Day Teaching</i>
P1	High	Instructing lab, Grading	Course instructor and fellow TA helped learn course concepts, the use of lab equipment, and discussed ways to effectively teach lab procedures
P2	Low	Grading, Holding office hours	Participant felt it took longer to respond to students when they needed the instructor's advice
P3	Low	Grading, Holding office hours	Participant could not convey student feedback about the course to the instructor as they did not feel comfortable doing so
P4	Low	Holding office hours	Participant received solutions to homework problems from the course instructor to prepare for office hours
P5	High	Grading, Holding office hours	Fellow TA(s) helped learn course concepts, make rubrics, understanding grading requirements, and find substitutes when traveling; Instructors shared grading work when needed
P6A*	High	Holding office hours, Instructing lab	Course instructors and fellow TAs collaboratively prepared course content including slides, assignments, and exams, and discussed teaching strategies during weekly meetings
P6B*	Low	Making assignments, Grading	Participant was allowed flexibility from course instructor and fellow TA in grading during their travels
P7	High	Grading, Holding office hours	Course instructor offered suggestions to better handle student questions and course maintenance issues such as late submissions, grading student work, and grade-review requests from students; Instructor also responded to student queries to reduce the GTA's workload

Note: *Participant P6 was a GTA for two courses, the details about the two courses are presented in two rows denoted by GTA IDs "P6A" and "P6B"

5 DISCUSSION AND IMPLICATIONS

Findings reveal key insights about GTAs' learning of teaching skills and their development as future faculty members. Participants engaged with their course instructors and fellow teaching assistants through both formal interactions in terms of scheduled meetings and email exchanges, and informal interactions in labs, classrooms, or the academic department. These interactions not only helped participants navigate their day-to-day teaching but also provided them with an avenue to improve their teaching skills. This finding aligns with prior scholarship, which advocates for ongoing support [6], [15] and regular meetings with course instructors and other teaching assistants [16].

From a situative learning perspective, learning happens through participation in a community of practice [17] and engaging in social interactions [18]. Hence, the GTAs were learning how to prepare for a course when they collaboratively worked with the course team to prepare course materials such as course slides, lab assignments, tests, or rubrics. Similarly, they learned effective ways to deliver the course

content, address student questions and concerns, and perform different course maintenance tasks through interaction with their course teams. Even the learning of course content with the help from the course instructor and fellow teaching assistants was done in the context of effectively delivering that content and hence it implicitly taught participants how to organize and present the course knowledge to students. Facilitating this kind of contextual learning for GTAs has been emphasized by prior scholarship [10]. While the data collected for this study did not capture whether the support from their course teams influenced the pedagogical practices of the participants, future work can be done to explore this aspect.

Beyond learning skills related to course preparation and delivery, participants' engagement with their course teams to accomplish other professional and personal responsibilities helped them learn workload management skills required of future academics. The job of a faculty member may entail several requirements including teaching, working with teaching assistants, research, traveling related to research, student supervision, and serving on different departmental and university committees in addition to personal responsibilities toward family and friends. Navigating teaching responsibilities with research commitment has been highlighted as an area of potential challenge for GTAs [14]. As participants worked with the course teams to manage their own research and family responsibilities, they learned how to move their schedules, find substitute teachers, and ask colleagues for help.

The data collected for this study do not necessarily suggest that GTAs experienced challenges in navigating everyday teaching due to a relatively low interaction with their course teams. The absence of such data may be because the weekly reflection prompts and interview questions did not explicitly ask the participants about the influence of the level of their engagement with the course teams on their teaching experiences. However, two participants still noted difficulties they faced in passing on student feedback to the course instructor and promptly responding to students due to a relative lack of interaction with the instructor. Thus, as these GTAs highlighted, the level of their engagement with the course team, especially the course instructor, influenced student learning. Future studies can explore how a lack of regular interaction with course teams influence GTAs' teaching experiences.

Hence, an opportunity for GTAs to have regular interactions with their course teams has implications for both GTAs and the students they teach. Course teams can help GTAs effectively complete day-to-day teaching responsibilities and provide them with avenues to learn effective and relevant teaching skills, thus facilitating their professional development. Also, a teaching assistant equipped with the knowledge of effective and relevant teaching skills can more effectively teach the course content, thus leading to better learning for students. Moreover, regular interactions between TAs and the course instructor can provide a means for students to ask course-related questions or deliver their concerns to the course instructor through the teaching assistants. Previous scholarship [14] has suggested that students perceive TAs to be more approachable and engaging as compared to professors who may seem distant. Hence, students may feel more comfortable in asking questions from or giving feedback to a TA as opposed to an instructor.

Implications also exist for course instructors, academic departments, and engineering programs. Instructors have a significant responsibility to ensure that students effectively learn the course material. Hence, it is important to have regular interactions with course TAs to teach them instructional techniques relevant to the course, and receive feedback about student learning and concerns. A knowledge of student concerns can help the instructor modify the course to better suit the learning needs of the students. As the findings of this study suggest, an absence of regular interaction between the course GTA and the instructor may inhibit the GTA to discuss

student concerns with the instructor, thereby preventing or delaying the course modifications needed to support student learning. Moreover, as GTAs gain experience in teaching a course, instructors can more heavily rely on them to complete various teaching tasks without supervision, thus ensuring that student learning is not significantly affected when the instructors themselves need to travel for professional or personal reasons. Giving GTAs more independence in performing teaching duties can also help them build confidence as teachers. Similarly, by ensuring regular interactions between the course instructor and GTAs, academic departments and universities can ensure an enhanced development of GTAs as future faculty and better course learning for the students they teach.

6 CONCLUSION AND RECOMMENDATIONS

This paper explored how course teams, comprising the instructor, the GTA, and other course TAs, support GTAs in navigating day-to-day teaching responsibilities using weekly reflection and interview data. This is an aspect of GTA development that is often overlooked in the literature, which often focuses on limited-duration training programs [7]. Findings suggest that regular formal and informal interactions with the course teams indeed help GTA prepare course materials, including slides, tests, assignments, and rubrics; deliver course content; and address student questions and concerns. At the same time, working together with the course teams helped GTAs manage several competing responsibilities, including research or personal travel. Findings also point to some difficulties and delays faced by participants in conveying important course-related feedback to the instructor or answering student queries in case of limited opportunities to interact with the course instructor. These findings highlight the importance of regular interactions with the course teams in building a community of practice for the GTAs. Through participating in this community of practice and interacting with its members, they were able to effectively navigate their teaching responsibilities, eventually leading to their development as future faculty.

Data for this study were qualitative and collected from a limited number of participants over one semester. Hence, the findings cannot be generalized. Future work that collects quantitative data from a large number of participants through representative sampling over a longer duration can be done to reach more generalizable findings.

Although the findings of this study cannot be generalized, significant recommendations can be drawn from them to improve GTAs' teaching experiences. First, opportunities to interact with course instructors and other GTAs should be established to help GTAs discuss challenges in course preparation and delivery and learn about possible strategies to navigate them. This can be done through weekly check-in meetings with the course teams. Second, GTAs should be provided with adequate resources that can help them learn about the course materials that they are going to help students with. Third, instructors should create faster communication channels for GTAs to ask specific questions about course preparation and delivery or relay feedback, especially in situations where delays can impede student learning. Fourth, formal mechanisms that accommodate GTAs' research and other travel needs should be created and communicated to them early in the semester.

7 ACKNOWLEDGEMENTS

The author would like to acknowledge the Virginia Tech Graduate Research Program for the research grant to compensate the participants for this study.

The author also thanks Dr. Margaret Blackie for reading an initial draft of this manuscript and providing constructive suggestions to improve it. However, any findings, recommendations, or opinions presented in this paper represent only the author's views.

8 REFERENCES

- [1] A. Haque and K. N. Meadows, "Impact of the lead TA program on the perceived disciplinary instructional competence of graduate teaching assistants," *Canadian Journal of Scholarship of Teaching and Learning*, vol. 11, no. 2, 2020. <https://doi.org/10.5206/cjsotl-rcacea.2020.2.11103>
- [2] D. Gormaz-Lobos, C. Galarce-Miranda, and H. Hortsch, "Online engineering education: A proposal for specialization of the teacher training in engineering," *International Journal of Engineering Pedagogy*, vol. 11, no. 5, pp. 105–121, 2021. <https://doi.org/10.3991/ijep.v11i5.22427>
- [3] A. Merceron, J.-M. Adam, S. Luján-Mora, M. Milosz, and A. Toppinen, "Faculty development and quality assurance in the EU ERAMIS project," *International Journal of Engineering Pedagogy*, vol. 2, no. 3, pp. 52–57, 2012. <https://doi.org/10.3991/ijep.v2i3.2149>
- [4] P. Rillero and H. G. Rillero, "Catalyzing change in engineering pedagogy: The role of workshops, modules, and reflective implementation," *International Journal of Engineering Pedagogy*, vol. 14, no. 2, pp. 4–19, 2024. <https://doi.org/10.3991/ijep.v14i2.42449>
- [5] E. E. Schussler, Q. Read, G. Marbach-Ad, K. Miller, and M. Ferzli, "Preparing biology graduate teaching assistants for their roles as instructors: An assessment of institutional approaches," *CBE—Life Sciences Education*, vol. 14, no. 3, p. ar31, 2015. <https://doi.org/10.1187/cbe.14-11-0196>
- [6] M. A. Parker, D. Ashe, J. Boersma, R. Hicks, and V. Bennett, "Good teaching starts here: Applied learning at the graduate teaching assistant institute," *Canadian Journal of Higher Education*, vol. 45, no. 3, pp. 84–110, 2015. <https://doi.org/10.47678/cjhe.v45i3.187546>
- [7] M. S. Palmer, "Graduate student professional development: A decade after calls for national reform," *Studies in Graduate and Professional Student Development*, vol. 14, pp. 1–17, 2011.
- [8] D. Boud and A. Brew, "Learning to teach as the development of practice," in *Theorising Learning to Teach in Higher Education*, London, UK: Routledge, 2016, pp. 77–92.
- [9] C. Deacon, A. Hajek, and H. Schulz, "Graduate teaching assistants' perceptions of teaching competencies required for work in undergraduate science labs," *International Journal of Science Education*, vol. 39, no. 16, pp. 2189–2208, 2017. <https://doi.org/10.1080/09500693.2017.1367110>
- [10] J. Zhou, "What is missing in the international teaching assistants training curriculum?" *Journal of Faculty Development*, vol. 23, no. 2, pp. 19–24, 2009.
- [11] L. M. Swan, S. Kramer, A. Gopal, L. Shi, and S. M. Roth, "Beyond proficiency: An asset-based approach to international teaching assistant training," *Journal of Faculty Development*, vol. 31, no. 2, p. 21, 2017.
- [12] S. Dotger, "Offering more than 'Here is the textbook': Teaching assistants' perspectives on introductory science courses," *Journal of College Science Teaching*, vol. 39, no. 3, pp. 71–76, 2010.
- [13] J. A. Luft, J. P. Kurdziel, G. H. Roehrig, and J. Turner, "Growing a garden without water: Graduate teaching assistants in introductory science laboratories at a doctoral/research university," *Journal of Research in Science Teaching*, vol. 41, no. 3, pp. 211–233, 2004. <https://doi.org/10.1002/tea.20004>

- [14] V. Muzaka, "The niche of graduate teaching assistants (GTAs): Perceptions and reflections," *Teaching in Higher Education*, vol. 14, no. 1, pp. 1–12, 2009. <https://doi.org/10.1080/13562510802602400>
- [15] E. Arshavskaya, "International teaching assistants' experiences in the US classrooms: Implications for practice," *Journal of Scholarship of Teaching and Learning*, vol. 15, no. 2, pp. 56–69, 2015. <https://doi.org/10.14434/josotl.v15i2.12947>
- [16] C. Rolheiser *et al.*, "Developing teaching assistants as members of the university teaching team," *Higher Education Quality Council of Ontario*, 2013.
- [17] J. G. Greeno, A. M. Collins, and L. B. Resnick, "Cognition and learning," in *Handbook of Educational Psychology*, D. C. Berliner and R. C. Calfee, Eds., New York, NY: Macmillan, 1996, pp. 15–46.
- [18] L. S. Vygotsky, *Mind in Society: The Development of Higher Psychological Processes*. Cambridge, MA: Harvard University Press, 1978.
- [19] T. T. A. Ngo, "Perception of engineering students on social constructivist learning approach in classroom," *International Journal of Engineering Pedagogy*, vol. 14, no. 1, pp. 20–38, 2024. <https://doi.org/10.3991/ijep.v14i1.43101>
- [20] R. Ab Rashid, M. F. Yahaya, M. F. A. Rahman, and K. Yunus, "Teachers' informal learning via social networking technology," *International Journal of Emerging Technologies in Learning (Online)*, vol. 11, no. 10, pp. 76–79, 2016. <https://doi.org/10.3991/ijet.v11i10.5908>
- [21] N. F. Baya'a, W. M. Daher, and A. A. Anabousy, "The Development of In-service mathematics teachers' integration of ICT in a community of practice: Teaching-in-Context theory," *International Journal of Emerging Technologies in Learning (Online)*, vol. 14, no. 1, pp. 125–139, 2019. <https://doi.org/10.3991/ijet.v14i01.9134>
- [22] J. Camarao and C. Din, "A group of people to lean on and learn from': Graduate teaching assistant experiences in a pedagogy-focused community of practice," *Teaching and Learning Inquiry*, vol. 11, 2023. <https://doi.org/10.20343/teachlearning.11.11>
- [23] B. Schwarz-Bechet, R. Bos-Wierda, and R. Barendsen, "Transatlantic online community of practice," *International Journal of Emerging Technologies in Learning (Online)*, vol. 7, no. 3, pp. 50–53, 2012. <https://doi.org/10.3991/ijet.v7i3.2213>
- [24] A. Agrawal, L. D. McNair, and M. C. Paretti, "Teaching in a foreign land: Experiences of international teaching assistants in U.S. engineering classrooms," in *2018 ASEE Annual Conference & Exposition*, Salt Lake City, UT: ASEE Conferences, 2018.
- [25] Indiana University School of Education, "Carnegie Classification of Institutions of Higher Education®," American Council on Education. [Online]. Available: <http://carnegieclassifications.iu.edu/>
- [26] M. B. Miles, A. M. Huberman, and J. Saldaña, *Qualitative Data Analysis: A Sourcebook*. Thousand Oaks, CA: Sage Publications, 2014.

9 AUTHOR

Ashish Agrawal, PhD, is an Assistant Professor in the College of Engineering Technology at Rochester Institute of Technology. His research interests include exploring the intricacies of STEM curricula, studying the influence of curricular features on students' experiences, and designing equitable interventions and assessing their influence on student learning. He has taught several introductory engineering courses using student-centric approaches such as project-based learning and flipped classroom (E-mail: atacet@rit.edu).