Designing TA Training for Computer Science Graduate Students: Remote and Self-paced Options for A Supported Introduction to Reflective Teaching

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ABSTRACT

Teaching Computer Science in public, research-focussed institutions is often a team effort, with graduate students serving key roles as teaching assistants. These graduate students come from diverse backgrounds and educational experiences. Many of them have not taken the course they are TAing, or took it at their undergraduate institutions under different norms and practices. We developed a course for first-time Computer Science TAs to help them navigate the mechanics of their role while learning evidence-based teaching and reflective practices. After the recent pandemic-induced emergency shift to remote learning, we introduced and evaluated three new modalities of delivering this course: synchronous, fully self-paced, and hybrid pacing. We find that student satisfaction with all the alternate versions of the course was generally positive and is not correlated with modality. We conclude that Computer Science departments have significant flexibility in developing formats for delivering TA training courses, and that these courses are valued by first-time Computer Science graduate student TAs.

CCS CONCEPTS

• **Social and professional topics** → **Computing Education**;

KEYWORDS

Teaching assistants, professional development, online computing education, graduate students

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1 INTRODUCTION

Working as a Teaching Assistant (TA) can feel like a rite of passage: another step in the journey from student to professional. For graduate students, the opportunities for TAs include a wide array of options. Graduate students serving as TA can have a tremendous

impact on their students, while also growing and learning from the role. These graduate students come from diverse backgrounds, including varied past experiences with teaching. Moreover, while some of these students see themselves as future academics, many industry-focussed Masters or PhD students may not plan on teaching much during their career. Programs to train graduate students in TA positions therefore have to both prepare these students to be effective in supporting the educational mission of the courses they are assisting and delivering meaningful and to deliver useful educational experiences to the graduate student TAs themselves.

To meet this challenge, our department has a term-long course required of all first-time CS graduate TAs. This course is intended to be a practical, hands-on introduction to the ins and outs of TAing at our institution, while serving to build community among our graduate students and offer them professional development as teachers and researchers. We've offered this training course for many years, attended by first-time CS graduate TAs in each given academic term, with required synchronous participation. Since the 2020 COVID-19 pandemic necessitated a shift to remote instruction, we took the opportunity to re-examine some of our assumptions about the format of this course and to evaluate its effectiveness. We ask the following research questions:

RQ1: Do first-time CS graduate TAs find the training course effective in supporting their TAship?

RQ2: Are there differences in the experiences of first-time CS graduate TAs in this course when aspects of it are moved online or adapted to allow self-paced work through course material?

2 BACKGROUND

Instruction in higher education institutions makes heavy use of TAs, with the US Bureau of Labor and Statistics reporting that, as of 2018, over a hundred and twenty thousand graduate TAs were employed across the United States [24] and increasingly, institutions in other countries adopting their use as well [26, 36]. TAs have significant student-facing roles, which may include leading discussion/ tutorial / recitation sections, developing assignments, building autograding infrastructures and grading rubrics, and holding drop-in office hours. Thus, TAs can drive the classroom climate and the grades awarded to students, both of which are factors that impact student retention in STEM disciplines [25] and inform student decisions about pursuing CS majors [18]. Moreover, there is evidence that female students may be more likely to seek help from TAs rather than instructors [2] and so TAs can play an important role in broadening participation in CS.

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TAs for a course may be more advanced undergraduate or graduate students. With surging undergraduate CS enrollments, many CS programs have ramped up their use of undergraduate TAs (UTAs). Correspondingly, significant work in the Computing Education Research (CER) community focusses on the experiences, training, and impact of these UTAs [8–10, 29, 30, 33]. A recent systematic literature review classifies the different ways in which UTAs are used and compares claims about their effectiveness [21].

While UTAs can be drawn from the plentiful undergraduate students available and can encourage undergraduate student community building, their more limited educational experiences may make them less suited for some of the tasks typically carried out by TAs. In particular, student assessment (both formative and summative) is challenging, and graduate teaching assistants (GTAs) may be better suited to supporting it [34].

Many professional Masters, research-based Masters, and Doctoral programs in CS are attracting students aware of the bright employment prospects the field offers in both industry and academia. The 2020 Taulbee report lists 17,153 doctoral students and 42,067 masters students in Computing across US and Canada, approximately 65% of whom are classified as nonresident aliens [38, Tables D10 and M8]. The diverse backgrounds and career goals of these graduate students inform their approach to TA experiences. GTAs face competing pressures [23, 26, 35] for their time and attention. Department and institutional support for teaching signals its value to GTAs and can impact their engagement and buy-in [14, 26].

Departmental support for teaching can be demonstrated by the training provided to (and required of) its TAs. Term-long training courses to support first-time TAs in multiple STEM disciplines were successful in boosting teaching evaluations, confidence, and interest in teaching [15, 20, 37]. In CS departments, informal [28] and formal training for UTAs has been explored [12]. Recent work [32] suggests that first-time CS GTAs value peer mentoring and suggestions from more experienced TAs.

Professional development models for TAs differ in duration and whether they are offered within academic units for GTAs working in specific fields. Grounded in Shulman's theory of Pedagogical Content Knowledge [31], programs that are discipline-specific [1, 17] can be effective in helping GTAs develop competencies in teaching successfully within their chosen field. There is evidence that pre-service training does not inoculate GTAs against lower teaching self-efficacy in their first experience teaching [6]. Thus, we developed a term-long course that all first-time CS GTAs are required to take *concurrent* with their first CS TA appointment.

An effective professional development course for CS TAs prepares them to be successful and to promote retention and success for their students by building a positive classroom climate, employing clear and fair grading, and providing role models in sciences [25]. Effective programs involve mentoring, teaching observations, and pedagogical training [3, 27]. A survey of professional development programs for GTAs in Mathematics departments reports that the most common elements of such programs include student feedback to GTAs, observations by experienced instructors, opportunities for GTAs to practice teaching, and instruction on best practices in pedagogy including lesson plan development and assessment [11]. Reflection on their own goals and growth helps GTAs make sense

of these experiences [22, 35]. With evidence that GTAs may not use teaching techniques that they don't have opportunity to practice [4], some TA training courses employ games and role-playing activities [5, 16] to create these opportunities. We report on the curriculum and structure of our course for first-time CS GTAs, which provides mentorship, reflection, and meaningful experiences.

3 CS GRADUATE TA TRAINING

All GTAs in our department are required to take a term-long training course concurrent with their first CS TA appointment. This course is in addition to campus-wide requirements for online learning modules on basic course mechanics, training on FERPA, accommodations for students with disability, and prevention of harassment. First-time CS GTAs are graduate students who have not already TAed CS classes; they may or may not be in their first year of graduate studies. The CS GTA training is designed around CS-specific pedagogical content knowledge and department norms and technologies that beginning TAs need for success.

The main goals of our CS-specific course are for each GTA to: effectively carry out the basic roles and responsibilities of a CS GTA, connect professionalism to teamwork and teaching and reflect on their development as a professional, and apply CER and insights from the Scholarship of Teaching and Learning (SoTL) in their classroom experiences. To work towards these goals, class activities include small group practicum and mentoring, reflective teaching practices, peer and self observation, and engagement with research. **Practicum:** groups of 5-8 first-time CS GTAs are formed based on the level and type of class they are TAing and are assigned a more experienced GTA as a mentor. These groups meet weekly for practicum sessions where they share their TA experiences from the week and are guided through role-playing activities, scenario discussions about inclusive practices and professional dilemmas, and practice with TA tasks such as micro-presentations or building grading rubrics.

Reflective journaling: each week, first-time CS GTAs record the hours that they spend on different TA-related tasks (such as team meetings, assignment preparation, leading discussions, office hours, grading, course administration, and others) and take stock of what went well and what they want to work to improve the next week.

Peer and self observation: first-time CS GTAs observe an experienced GTA leading a discussion section or holding office hours, and then are observed in turn. The observations are preceded and followed by short conversations for goal-setting and feedback. Alternatively, first-time CS GTAs can choose to review a recording of themselves teaching, reflect on what was effective and what they would like to change, and then record and view their teaching a second time to work towards improving their teaching.

CER/SoTL papers: first-time CS GTAs are introduced to literature on learning science and the specific questions that arise in the context of CS to ground their teaching practices in theory and evidence. For example, we read the paper by Lewis, Yashuhara and Anderson [18] and draw from it lessons about the impact of the GTAs as they work with their students. As another example, we read Bertram Gallant's paper [13] on the role of an instructional team in building a culture of integrity for a course and the implications of that culture for diminishing student cheating behaviors.

In this paper, we study multiple offerings of the training course for first-time CS GTAs, conducted both in-person and via remote delivery. In each offering of the course, the **practicum**, **reflective journaling**, and **peer and self observation** components were substantially the same. Of course, practicum groups and observations occurred via Zoom when the 2020-2021 pandemic necessitated it, but maintained their cadence and format otherwise.

To engage with CER/SoTL literature, in-person offerings of the CS GTA training course traditionally held weekly 45 minute meetings where all first-time CS GTAs congregated and took turns presenting highlights from a curated list of papers, organized by topic. The presentations were short (under 10 minutes) and included some exposition and some group activity such as a think-pair-share [19] discussion prompt on the topic. Engaged attendance at these presentations were expected from all first-time CS GTAs, and attending the presentations served the dual purpose of learning about the CER/SoTL papers and learning from the presentation style and delivery of their peer first-time CS GTAs. The course instructor gave brief public feedback after each presentation to point out particularly effective strategies that the presenters used and to suggest alternate approaches and ideas to try. These feedback sessions often prompted class-wide discussion about the teaching choices we make and their rationale. We call this version of the first-time CS GTA Training course the in-person, synchronous modality **ISync** and use it as a reference (control) point in the study.

During emergency remote instruction in academic year 2020-2021, we could no longer meet in person for these large group presentations and feedback sessions. Moreover, first-time CS GTAs from offerings of the **ISync** class gave feedback that they would have appreciated some flexibility in the scheduling of topics that we discuss (so that, for examples, GTAs who do a lot of grading can look at the research on rubrics before they have to grade their first assignment, while GTAs who are giving discussion sections can first focus on active learning strategies and building inclusive classrooms). To that end, we tried three versions of the remote offering. The first (**RSync**) emulated the synchronous student presentations and feedback model of the **ISync** modality on Zoom. For more flexible scheduling, the **RSelf** and **RHybrid** modalities had students read the abstracts of each of the collected education research papers, make predictions about how they might apply to their work as a CS TA, and then choose one paper to read thoroughly and prepare a presentation and discussion activity synthesizing its main message for CS GTAs. They then recorded their presentation and received asynchronous written feedback on it from the instructor of the CS GTA Training course. In the fully self-paced **RSelf** modality, the deadline for responding to all paper abstracts, selecting a paper, and completing the presentation video and discussion activity plan for that paper was the last day of the term. In the **RHybrid** pacing modality, papers were grouped into two batches. The presentation video and discussion activity plan had to be completed halfway through the term along with the first batch of abstract responses; the second batch of abstract responses were submitted by the last day of the term. The four modalities of the course, along with the terms during which they were offered, are summarized in Table 2.

4 SETTING AND METHODS

The research took place at a public, research-focussed university in the western US with a large CS graduate program, including significant Masters and PhD populations. This institution has three terms each academic year: Fall, Winter, and Spring. Roughly 100-150 GTAs are hired each term to support CS classes. Approximately a third of those hired each term are TAing CS classes for the first time and so enroll in the required CS GTA training course. Each term, the plurality of first-time CS GTAs are Masters students, see Table 1.

First-time CS GTAs are hired to work on classes at a range of levels, including lower division (freshmen- or sophomore-level undergraduate classes), upper division (junior- or senior-level undergraduate classes), and graduate classes. A GTA may be hired to work on a course that they have not taken before, so long as they demonstrate sufficient proficiency in the material. Across the terms being studied, 60 of the first-time CS GTAs TAed lower division classes, 181 of the first-time CS GTAs TAed upper division classes, and 79 of the first-time CS GTAs TAed graduate classes. The median number of other CS courses in which first-time CS GTAs enrolled during their first term TAing is 2.

Term	Academic Level			Total
	BSMS	MS	PhD	
19F	5 (7%)	50 (71.5%)	15 (21.5%)	70
19W	3 (6%)	29 (59%)	17 (35%)	49
19S	3 (7%)	29 (64%)	13 (29%)	45
20S	0 (0%)	20 (51%)	19 (49%)	39
20F	8 (12%)	39 (59%)	19 (29%)	66
21W	4 (12%)	17 (53%)	11 (34%)	32
21S	4 (11%)	17 (43%)	16 (46%)	37

Table 1: Academic level of first-time CS GTAs, ranging from the fifth year of a BS/MS program to Masters students and PhD students, grouped by term (F denotes Fall, W denotes Winter, S denotes Spring).

In the terms being studied, first-time CS GTAs completed a pre-survey with questions about their TA assignment, course load, academic level, and attitudes about TAing. At the end of the term, a post-survey was given asking about their experiences with the first-time CS GTA Training course as well as their attitudes about TAing. To measure these attitudes, the STEM GTA-Teaching Self-Efficacy Scale (STEM GTA-TSES) [7] was included in the surveys. This is a validated eighteen item instrument, each item measured on a five point scale ranging from “no confidence” to “complete confidence”. The midpoint scale value was used to impute missing values. We found the reliability of this instrument within our data to be quite high, with Cronbach’s $\alpha = 0.89$ and 0.90 in the pre-survey and post-survey, respectively.

The research plan was shared with GTAs enrolled in the course at the beginning of the term and they were invited to opt out of their anonymized data being used for this research if they so chose; the protocol was certified exempt by our institution’s IRB. The research data were anonymized before use and analysis began only after the course was complete. Pseudonymous identifiers were used to

Modality	Term(s)	Practicum	Journal	Observation	Papers
ISync	19W, 19S, 19F	In-person, weekly	Online form	In-person, synchronous	In-person presentation to group, facilitated activity, and discussion
RSync	20S *, 20F	Zoom, weekly	Online form	Zoom, synchronous or asynchronous	Zoom presentation to group facilitated activity, and discussion
RSelf	21W	Zoom, weekly	Online form	Zoom, synchronous or asynchronous	Self-paced reading of abstracts, video presentation and activity plan
RHybrid	21S	Zoom, weekly	Online form	Zoom, synchronous or asynchronous	Batched reading of abstracts, video presentation and activity plan

Table 2: Summary of four modalities of a training course for first-time CS GTAs, along with when they were offered (F denotes Fall, W denotes Winter, S denotes Spring). *A single instructor taught all offerings of the first-time CS GTA Training course included in this study, except in 20S when a different instructor taught the course.

match pre- and post- data. Duplicate survey entries were removed from the data set, keeping only the entry with the latest timestamp for each respondent for each survey. Pre-survey submissions for students who did not have post-survey submissions were removed. Data analysis was performed using Pandas, Numpy, Matplotlib, Seaborn, Scipy, and Pingouin.

To answer the research questions about whether first-time CS GTAs find the training course we designed effective in supporting their TAship, we studied aggregate responses from CS GTAs across seven offerings of the course. These offerings varied in modality, so we compare student experiences within these offerings to answer the second research question and look for differences in the first-time CS GTA experience across these modalities.

5 RESULTS

5.1 Course supported TAship

To start to answer the research question about whether the course was effective, we analyze responses to the post-survey question asking “Did you feel that [the course] supported your efforts as a first-time TA this quarter?” across all seven offerings. Of 323 responses in the dataset, 271 (84%) responded “Yes”, 41 (13%) responded “Maybe”, and 11 (3%) responded “No”. The term-by-term responses are presented in Figure 1; the highest percentage of first-time CS GTAs responding “Yes” in a single offering was 90% (in 19F) and the lowest percentage of first-time CS GTAs responding “Yes” in a single offering was 76% (in 21S).

We ran a two proportion t -test to see if the proportions of first-time CS GTAs in **ISync** offerings who answered “Yes” was significantly different from the proportion of first-time CS GTAs in all remote modalities (**RSync**, **RSelf**, or **RHybrid**). With test statistic 0.965 and $p = 0.335$, we cannot reject the null hypothesis that the proportions are the same.

Across the remote offerings, we check for association with responses to the question “Did you feel that [the course] supported your efforts as a first-time TA this quarter?”. To avoid small bins in the cross-tabulation, we group the two negative responses to the question (“Maybe” and “No”) in this calculation, see Table 3. With three degrees of freedom we get $\chi^2 = 2.994$, $p = 0.392$ and cannot reject the null hypothesis that CS GTAs who participate in the training course reported feeling supported by the course independently of the modality in which it was offered.

Modality	Supported? “Yes”	Supported? “Maybe/No”
ISync	141 (87%)	22 (13%)
RSync	80 (83%)	16 (17%)
RSelf	22 (81%)	5 (19%)
RHybrid	28 (76%)	9 (24%)

Table 3: First-time CS GTAs who reported that the TA training course supported their TAship, by course modality.

These results suggest no association between the extent to which first-time CS GTAs felt supported by the course and the modality in which it was offered.

5.2 GTA-Teaching Self-Efficacy

Another measure of effectiveness of the course is confidence among first-time TAs in their ability to successfully carry out TA-related duties. We use the STEM GTA-Teaching Self-Efficacy scale to quantify this. As we see in the box plot in Figure 2, scores on the STEM GTA-Teaching Self-Efficacy tended to increase over each term.

Figure 1: Proportion of first-time CS GTAs taking TA training course who reported that the course supported their TAship, by term course offered.

Figure 2: STEM GTA-TSES score of first-time CS GTAs: pre-survey scores are visualized with the box-and-whisker plot (brick colored bars) and post-survey scores are overlaid in the scatter plot (blue colored data points), by term course offered.

Modality	STEM GTA-TSES		Paired-samples <i>t</i> test <i>t</i> (<i>p</i> value)
	Pre (mean, stdev)	Post (mean, stdev)	
ISync	(3.89, 0.47)	(4.14, 0.53)	4.13 (< 0.0001)
RSync	(3.92, 0.53)	(4.18, 0.42)	8.06 (< 0.0001)
RSelf	(4.04, 0.48)	(4.21, 0.50)	2.53 (0.020)
RHybrid	(3.82, 0.46)	(4.00, 0.38)	2.69 (0.012)

Table 4: Paired-samples *t* test for pre-survey and post-survey STEM GTA-Teaching Self-Efficacy Scale for first-time CS GTAs

We use paired-samples *t* test to study whether the STEM GTA-Teaching Self-Efficacy scores for first-time CS GTAs changed after their first TAship and accompanying participation in the CS GTA Training course. Aggregating over all course offerings, with 295 responses, we find a significant difference between the STEM GTA-TSES pre-term score (mean = 3.90, stdev = 0.49) and the STEM GTA-TSES post-term score (mean = 4.15, stdev = 0.46), with $t = 9.474$, $p < 0.0001$. The analyses for each course modality are tabulated in Table 4, and we see significant difference between pre- and post-term means in each modality.

Both in aggregate and by course modality, we see consistent differences in GTA teaching self-efficacy at the end of a term of TAing and participating in a TA training class, with mean STEM GTA-TSES scores higher in post-surveys.

6 DISCUSSION

6.1 How self-paced is self-paced?

The self-paced structure of **RSelf** and **RHybrid** was designed to give first-time CS GTAs flexibility to engage with CER/SoTL papers that are most relevant to their TA-appointment-specific activities earlier on in the term. The unfortunate (though unsurprising) reality, however, was that almost all GTAs in these self-paced offerings of the course did not submit any work for the CER/SoTL component

of the class until the deadline. We predicted that this might happen since our GTAs are typically very busy during their first term TAing, juggling their own coursework along with the significant ramp-up involved in starting to teach, and often also interviewing for internship or full-time job opportunities and working on research. In light of this, we feel justified in carving out only a small part of the course to be self-paced, maintaining the weekly cadence of the hands-on practice components of the first-time CS GTA Training course so to give structured, lightweight support for these very busy students.

6.2 Practicum

The practicum component of the first-time CS GTA Training course is consistently mentioned favorably in post-term surveys. Across the offerings studied in this project, 224 of 325 responses specifically referred to the practicum when answering the question “*What aspects of [the course] did you enjoy the most?*”. Responses spoke to the value of community building, validation, and the opportunity to vent their feelings to one another in their practicum groups. They also valued the opportunity to practice working through difficult but realistic situations and to troubleshoot challenges they were facing in their TAship with their mentor and practicum group. For example:

I loved the weekly practicum sessions! I enjoyed the roleplaying sessions there and also getting to interact with other fellow TAs and our mentor TA. I think having those sessions helped reinforce good practices and also meeting regularly helped serve as a personal check on how I was conducting my activities as a TA. (21W)

The mentors facilitating the practicum sessions are volunteers recruited from the pool of experienced CS GTAs. We would not be able to run practicums without them, and it is a measure of the value that these GTAs see in the practicum that we have been able to fill all the spots we need for mentors with volunteers each term: more than half of first-time CS GTAs (195 of 325 responses in our data set) indicated they might be interested in volunteering as a mentor GTA for practicum groups in future offerings of the course.

6.3 Persistent groups for community

First-time CS GTAs reported that the community building in the TA training course (through practicum groups and also in wider class discussions) validated their experiences and helped build social networks. Some students mentioned the value of these connections especially in the remote context of the 2020-2021 academic year, with one student writing “This was a stressful quarter, but [my mentor] and my other TAs really helped me get through it.” (21S) In all the offerings of the course described in this project, practicum groups were selected at the start of the term and remained stable throughout. The groups were formed so that GTAs working on similar class types (lower division programming, for example, or hardware labs) could learn from one another. On the other hand, we tried to separate GTAs who were working on the very same class so that the practicum mentor groups could be safe spaces to troubleshoot inter-TA challenges that sometimes occur within TA teams. Also, we made every effort to avoid groups where one

member was a TA for another, but this was challenging in terms when many of our first-time CS GTAs were TAing graduate level classes. While it was challenging to find groups that satisfy all these constraints, it may be worth considering whether to mix up the practicum mentor groups once or twice during the term to give the first-time CS GTAs opportunities to work with more of their peers.

6.4 Synchronous vs. asynchronous experience

In synchronous offerings of the course (**ISync** and **RSync**), first-time CS GTAs had opportunities to learn from one another in larger-group settings and to facilitate and participate in active learning activities. Many students reported benefiting from this, both when the group activities were in person:

I liked the integration of the engagement activities in each class and how we were using the techniques to learn about other techniques. I also like how comfortable I got in the class with everyone and would love to have my students feel like that in discussions. (19F)

and when they were remote (over Zoom):

I enjoyed watching others present, then considering and discussing their teaching styles and how they are beneficial or can be improved. (20F)

The synchronous format also allowed the course instructor to share feedback with presenters in real time and in public, increasing the saliency of the feedback for the presenters and allowing all the class participants to learn from it. For asynchronous offerings (**RSelf** and **RHybrid**), written feedback on videos was provided by the instructor. We noticed that none of the student responses to the post-term survey question “*What aspects of [the course] did you enjoy the most?*” referenced this feedback on the video, whereas a sizable fraction (78 of 260) of responses from the synchronous offerings explicitly identified learning from and participating in their peers’ presentations as a highlight of the course. Despite this, we did not see a statistically significant difference in satisfaction with the course or self-efficacy gain in these modalities.

6.5 The value of CER/SoTL in GTA Training

In addition to GTAs, our department has a robust and significant UTA program. When we designed the training course for first-time CS GTAs, we looked for ways to distinguish the graduate student experience from that of the undergraduates, especially considering the union-mandated differences of the roles that students in these different positions serve in classes. Many of our graduate students responded positively to the inclusion of research papers from the CER and SoTL literature in the class, the engagement with research lending the class some more credibility as a graduate-level seminar. Many of those who had prior teaching experience reported that they hadn’t been aware of the existence of this research into effective teaching and CS education.

The in class presentations and discussions were very pleasant and enjoyable. I had not come across most of the content earlier and it was nice to learn new perspectives on teaching and learning. (19S)

Introducing this literature also has the potential of attracting new graduate students to pursuing CER and SoTL themselves.

6.6 Limitations and future work

Our analysis compares the responses of first-time CS GTAs to survey questions and TA-self-efficacy instruments after their first term TAing and participating in a training course. Since the training course is offered concurrently with the first TAship, the results can only be interpreted for the combination of the training course and the TA experience.

The metrics we employed in our analysis are based on the CS GTAs’ experiences. An effective TA training program should lead to positive interactions by the CS GTAs with their students and with the instructors they are supporting. Future work could use student and instructor evaluations of GTAs as additional sources of data, studying relationships between effectiveness of GTAs and different components and modalities of the CS GTA Training course. In our experience, response rates for end-of-term evaluations of GTAs are very low and so focus groups or other data collection approaches may be needed.

Given the significant impact TAs can have on sense of belonging and retention of students in their classes, it is also important to study whether the inclusive, student-centered approaches practiced in the first-time CS GTA Training course are adopted by the GTAs in their TAships and whether they are effective in contributing to efforts to broaden participation in computing.

Other factors to consider for future work on CS GTA experience include whether different aspects of training and professional development are important and impactful for CS GTAs who are new to the university (e.g. to introduce specific local norms and practices) or who are not native English speakers, for example.

7 CONCLUSION

We built a term-long TA training course for first-time CS GTAs. To develop both practical skills and evidence-based pedagogical practices, the course incorporates three main components (1) small-group mentored practicum with weekly meetings, (2) reflective journaling, and (3) engagement with education research. GTAs respond positively to each of these components and we see evidence that they feel supported by this course to succeed in their TAships. Across multiple modalities of offerings of the course, we saw that first-time CS GTAs valued peer community and mentor feedback, and that engagement with CS Education Research gave a platform for grounding and practicing best-practices. Departments with significant GTA involvement in teaching would be well-served by incorporating sustained peer mentored, reflective, and CER/SoTL-anchored training opportunities for their graduate students.

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