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Impact of the Lead TA Program on the Perceived Disciplinary Instructional Competence of Graduate Teaching Assistants

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Impact of the Lead TA Program on the Perceived Disciplinary Instructional Competence of Graduate Teaching Assistants

Abstract
Graduate teaching assistant (GTA) training initiatives such as the Lead TA Program seek to enhance the instructional competence of GTAs at a disciplinary level. This paper outlines the results of a mixed-method study conducted to evaluate the perceived impact of the Lead TA Program on GTAs during a two-year pilot implementation stage at a large, research-intensive Canadian university. As a result of participating in programming offered by Lead TAs, GTAs reported overall gains in their confidence as an instructor as well as increased disciplinary instructional competence. GTAs' perceived benefits in relation to disciplinary instructional competence included: (a) increased knowledge of the TA role in the context of their department, (b) gains in pedagogical content knowledge, and (c) increased classroom management skills when facilitating disciplinary tasks or discussions. The study points to the potential for the Lead TA Program to enhance the general, domain, and topic-specific pedagogical content knowledge of GTAs. Unique challenges of implementing discipline-specific programming are addressed and recommendations are offered for establishing similar programs at other universities.

Les initiatives de formation pour les chargés de cours à l'enseignement supérieur telles que le Lead TA Program cherchent à renforcer les compétences en enseignement des chargés de cours à l'enseignement supérieur à un niveau disciplinaire. Cet article décrit les résultats d'une étude à méthode mixte menée dans le but d'évaluer les effets perçus du Lead TA Program par les chargés de cours à l'enseignement supérieur lors d'une étude de deux ans menée dans une grande université canadienne axée sur la recherche. Après avoir participé à la programmation offerte dans le cadre du Lead TA Program, les chargés de cours à l'enseignement supérieur ont rapporté qu'ils avaient acquis une plus grande confiance en tant qu'instructeurs ainsi que de meilleures compétences en enseignement de leur discipline. Les compétences en enseignement obtenues par les chargés de cours comprenaient : (a) une meilleure compréhension du rôle des chargés de cours dans le contexte de leur département, (b) une meilleure compréhension du contenu pédagogique et (c) de meilleures compétences de gestion de la salle de classe lors des tâches ou des discussions liées à la discipline. L'étude illustre le potentiel du Lead TA Program pour renforcer les compétences des chargés de cours en matière de contenu pédagogique, tant général que spécifique au domaine. Les défis uniques pour la mise en oeuvre de la programmation spécifique à la discipline sont expliqués et des recommandations sont proposées pour établir des programmes similaires dans d'autres universités.

Keywords
graduate teaching assistant training, Lead TA Program, disciplinary instructional competence, pedagogical content knowledge, mixed method research; formation des chargés de cours à l'enseignement supérieur, Lead TA Program, compétences en enseignement liées à la discipline, connaissances du contenu pédagogique, recherche à méthode mixte

Cover Page Footnote
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An important trend to emerge in graduate teaching assistant (GTA) training in Canada is the development of peer mentor programs which enhance the disciplinary instructional competence of GTAs. Because GTAs are often assigned to introductory level courses, they play a significant role in introducing the discipline to undergraduate students (Gardner & Jones, 2011). To be successful scholars and instructors, graduate students must learn not only the academic structure of their discipline but also how to communicate those disciplinary norms and knowledges to students (Dimitrov, 2012; Ronkowski, 1998). Given that disciplinary communities function as unique cultures with shared norms of what constitutes appropriate communication and research (Becher & Trowler, 2001), the socialization of graduate students to disciplinary cultures of teaching becomes a necessary precursor to the acquisition of instructional competence in the discipline (Dimitrov, 2012).

The importance of combining teaching with disciplinary expertise is captured by Shulman's (1986) notion of excellence in teaching as a combination of pedagogical (general best practices in teaching), content (knowledge of the subject matter), and pedagogical content knowledge (the ability to apply general teaching principles to the discipline). Pedagogical content knowledge (PCK) draws on a set of skills that allows instructors to mobilize their subject matter expertise for the purpose of instruction rather than research and involves the specific ability to organize, adapt, and present concepts in ways that enhance the learning of undergraduate audiences (Berliner, 1991; Cochran et al., 1993; Mishra & Koehler, 2006). Veal and MaKinster (1999) further provide a taxonomy of PCK to delineate a hierarchy of the disciplinary knowledges involved in teaching. Their model differentiates between three different and unique levels of PCK that move from general to more specific: general disciplinary PCK (which involves the skills and expertise involved in teaching Science, for example), domain-specific PCK (or the knowledge involved in teaching specific subjects within Science, such as Biology or Chemistry), and topic-specific PCK (which encompasses the ability to teach particular topics within Chemistry such as solubility or oxidization). In this way, the framework identifies distinctions among knowledge bases between disciplines, subjects, and topics with the aim of tailoring instructional methods to meet the aims of each of these levels.

The Lead TA Program discussed in this paper supports the development of disciplinary instructional competence among GTAs[1]. Offered at over 60 higher education institutions across the United States (Palmer, 2011; Pinder-Grover et al., 2011), and now seeing increased interest in Canada, Lead TA-type programs employ a peer mentorship approach to facilitate the professional development of GTAs at a discipline-specific level. In this model, experienced graduate students are trained in pedagogy to design and offer teaching development activities for other GTAs in their home departments (Thomas & Border, 2011). Recent conference presentations at the Society for Teaching and Learning in Higher Education and the Educational Developers Caucus signal increased scholarly attention to this type of programming in Canada. Sessions at these conferences have offered case studies of discipline-specific peer mentor models of TA development recently implemented at Canadian universities (Atkins et al., 2016; Gourlay & Korpan, 2018; Hannon et al., 2014; Kasprzak et al., 2016), preliminary research on effective program design (Atkins et al., 2016; Burnett, 2015; Hannon et al., 2014), and workshops to solicit feedback from GTAs about their perspectives on such programming (Burrows, 2015).

[1] There is no consistent title for these programs across North America, and institutions opt for a variety of titles; for example, the University of Victoria refers to their program as "Teaching Assistant Consultants" while Harvard University uses the term "Departmental Teaching Fellows." Our program draws its name from the "Lead Network Program" at the University of Colorado-Boulder.

This paper contributes to the emerging scholarship of Lead TA-type programs in Canada by sharing the results of a mixed method study conducted to evaluate the impact of the program during its pilot implementation stage at The University of Western Ontario, a large research-intensive university in London, Ontario, Canada. The first aim of this paper is to offer insight into the self-reported impact of the Lead TA Program on both the general and disciplinary instructional competence of graduate students who attended Lead TA programming while the second aim is to offer recommendations for implementing the program at other research-intensive institutions.

Format of the Lead TA Program

GTA training programs that employ experienced GTAs as mentors to support instructional development initiatives vary in both their approach and the scope of responsibilities they place on the GTA mentor: while some programs emphasize one-on-one teaching consultations (Wright et al., 2015), others require the GTA mentor to take an active role in developing programming. Thomas and Border (2011) use the term, "graduate student consultant" (GSC) to broadly refer to GTA facilitators who have been hired by centres of teaching and learning (CTLs) to offer a range of "peer mentoring, consultation, workshops, and leadership" professional development activities (p. 37). The Lead TA Program at The University of Western University focuses on GSCs whose primary responsibilities include the facilitation of workshops and the development of GTA training resources; it is modelled on the Departmental Teaching Fellows Program at Harvard University and the Teaching Assistant Consultant Program at the University of Victoria. Because there is no consistent term in the literature to refer to this particular category of GSC programming, we refer to them as "Lead TA-type programs" throughout this paper.

The Lead TA Program is designed to supplement the general interdisciplinary GTA training already offered by the university's CTL. Because the CTL offers a comprehensive suite of interdisciplinary GTA training programs ranging from one-day orientations to three-day workshops and even a semester-long course on pedagogy, the Lead TA Program aims to build relationships with departments on campus and tailor GTA training to unique disciplinary needs. The core outcomes of the Lead TA Program include (a) identifying departmental GTA training needs, (b) facilitating discipline-specific GTA development workshops, and (c) developing print or online discipline-specific resources for GTAs. Each year, eight graduate students are selected through a competitive hiring process to serve as Lead TAs for their departments or faculties where they facilitate a range of teaching development opportunities for GTAs, as summarized in Table 1.

Table 1
Responsibilities of Lead TAs during their Appointment

Month	Responsibilities
September	• Lead TAs introduce themselves to graduate students at their departmental orientation. • Lead TAs conduct a needs assessment in their department or faculty to solicit feedback from both graduate students and faculty members to determine GTA training needs. • Lead TAs complete an annual implementation plan that outlines their goals and projects for the year.
October - March	• Lead TAs design and facilitate 4-6 workshop for GTAs during the academic year (approximately one workshop per month). • Lead TAs conduct peer teaching observations of GTAs in their departments as requested by GTAs. • Lead TAs conduct one-on-one consultations with GTAs as requested by GTAs.
April	• Lead TAs submit their "Legacy Project" – a print or online resource they developed during the year. Examples of legacy projects include departmental handbooks and online GTA training modules.

The program completed its two-year pilot term in April 2015 during which time it positioned 17 Lead TAs in 13 departments and faculties across campus where they facilitated a total of 117 workshops for over 1160 attendees[2]. Workshops covered a variety of discipline-specific topics, such as "Teaching Students how to Read and Write Philosophy Papers," "Strategies for Teaching Close Reading," "Teaching Critical Thinking in Women's Studies," and "Creating Effective Science Presentations." Six departments opted to hire department-specific Lead TAs (e.g., one dedicated Lead TA for the department of English) and seven faculties selected faculty-wide Lead TAs (e.g., one Lead TA to provide programming for GTAs in the faculty of Science).

Lead TAs were supported in their roles through a dual-supervision model comprised of a formal supervisor in their department as well as a staff member from the CTL who served as the program coordinator and provided ongoing training for Lead TAs. This training included a mandatory four-day workshop designed to develop Lead TAs' facilitation skills, increase their knowledge of GTA development models (Ferzli et al., 2012), and introduce them to discipline-specific pedagogies (Meyer & Land, 2003; Shulman, 2005). Lead TAs also participated in a monthly community of practice to continue to develop their skills.

Research on Lead TA-type Programs

In the literature on existing Lead TA-type Programs, the goal of taking a departmental approach is clear: Teaching strategies can be directly applied to the content knowledge of a given discipline (Bubbar et al., 2017; Gappa, 1991; Horii, 2010). For example, workshops led by Lead TAs can help participating GTAs explore issues relevant to teaching particular concepts (e.g., literary criticism) or to working in a unique setting (e.g., a human anatomy laboratory). Drawing on the concept of PCK, Lead TA-type programs combine both discipline-specific and generalized

[2] This number does not refer to unique participants but to the total number of graduate student registrations.

instructional components (von Hoene, 2011). A 2011 study conducted by Thomas and Border (2011) surveyed program directors at 25 institutions across Canada and the United States to identify the key intended and enacted outcomes of GSC programs. Fifty-two percent of surveyed program directors identified discipline-specificity as the primary intended outcome of GSC programming and 72% identified discipline-specific workshops as a core activity carried out by GSCs.

Research on Lead TA-type programs has explored the program from a range of perspectives. Thomas and Border (2011) and Wright et al. (2015) have considered components of effective training design when preparing Lead TAs for their role. Thomas and Border (2011) determined GSC programs to be designed effectively in that the program outcomes guide how GSCs are trained and that the GSCs, in turn, enact the types of programming they were trained to do. Colleagues at Michigan (Pinder-Grover et al., 2008) and Harvard (Horii, 2010) have explored training design as well as the impact of the program on Lead TAs themselves through self-report measures. An important outcome of the program at Harvard has been that departmental teaching fellows are able to effect change within departmental teaching cultures because of their unique liminal position as graduate students (Horii, 2010). Most relevant to the current study, program evaluation conducted at the University of Michigan assessed the impact of the Peer Teaching Consultants program on graduate students who attended the programming (Pinder-Grover et al., 2011). This study revealed that the Teaching Consultants program has a positive impact on graduate students' instructional abilities: Graduate students reported gains in teaching confidence and in acquiring specific strategies to improve their teaching. These existing studies on Lead TA-type programs do not, however, assess the impact of the program on the disciplinary teaching competence of graduate students. Our study addresses this gap by exploring the perceived gains of the Lead TA Program on both the general and disciplinary instructional competence of GTAs who participated in Lead TA training activities. Given the large percentage of GSC programs that emphasize discipline-specificity as a key outcome, this is a critical area of exploration.

Method

GTAs who participated in Lead TA workshops were invited to complete a reaction evaluation form (i.e., a feedback form) at the end of each workshop, an online survey at the end of the academic year, and participate in a focus group four months later. Survey questions were designed to gain a sense of the perceived impact of the program on GTAs' general instructional competence while reaction evaluations and focus groups provided opportunities to explore self-reported general and disciplinary instructional competence. This project was approved by the university's Human Research Ethics Board (HREB ID: 106572).

A mixed-methods design was utilized for this study because it allowed for a multiphase approach involving both concurrent and sequential analysis to address our overall goals of program evaluation and improvement (Creswell & Plano Clark, 2011). Combining quantitative and qualitative approaches allowed access to both large sample sizes with the potential to analyze trends and make generalizations about the program's impact while also considering the details and in-depth analysis afforded by small group conversations. The study involved two distinct phases. The first phase of the research project included the implementation of short reaction evaluations consisting of both open- and closed-ended questions at the end of each Lead TA workshop. Results of these surveys were analyzed on an ongoing basis and used to inform overall program and workshop design. This phase of the study enabled us "to translate research findings into practice

through developing materials" and workshops throughout the year (Creswell & Plano Clark, p. 103). The second phase of the study involved the concurrent parallel implementation and analysis of focus groups and surveys to gain further insight into the program at the end of the academic year after all workshops were completed.

Participants

Reaction Evaluations

Three hundred and thirty-eight GTAs completed end-of-workshop feedback on the Lead TA sessions they attended[3]. These GTAs represented a variety of disciplines: Engineering (47), English (23), Health Science (35), Hispanic Studies (13), Medicine and Dentistry (39), Philosophy (80), Science (40), and Women's Studies (61).

Survey

Seventy-three TAs who had attended at least one of the Lead TA workshops participated in the survey. The demographic characteristics of the survey respondents are provided in Table 2.

Focus Groups

Eleven GTAs participated in the focus groups (8 Ph.D. and 3 Master's students). The majority of these GTAs were from STEM disciplines: Science (3), Medicine and Dentistry (5), Engineering (2), and English (1). There were a variety of levels of teaching experience represented by the group: Five were novice instructors who had served as GTAs for one or two academic terms while the remaining five GTAs had at least five terms of TA experience each.

[3] Although end-of-workshop evaluations were implemented during both years of the program, a standardized end-of-workshop feedback form was not implemented until Year 2 of the program after we obtained ethics approval. Consequently, this study only includes data from the Year 2 feedback forms which were completed by 338 GTAs.

Table 2

Demographics Characteristics of Survey Respondents

Demographic Variable	Frequency[1]
Department/Faculty of Workshop	$n = 73$[2]
Education	8
Engineering	10
English	9
Health Sciences	10
Hispanic Studies	3
Medicine and Dentistry	8
Philosophy	4
Psychology	2
Science	16
Women's Studies and Feminist Research	5
Degree/Year in Program	$n = 65$
Masters	21
Ph.D.	44
Terms as TA	$n = 70$
Mean	3.61 ($SD = 2.62$)

Note. [1]Number of participants (*n*) varied due to missing data, including participants selecting the "I prefer not to answer" response option. [2]Two participants indicated that they attended workshops from two departmental and/or faculty Lead TAs, thus the total of the Department/Faculty Workshops attended (75) is greater than the number of participants (73). That said, in most cases it would be students in those departments/faculties attending the workshops.

Procedure and Materials

Reaction Evaluations

At the end of each Lead TA workshop, Lead TAs distributed reaction evaluation forms to the GTAs attending the session. The form consisted of three closed- and three open-ended items. Participants rated the overall usefulness of the workshop (1 = Not at all useful to 5 = Very useful), the overall effectiveness of the workshop facilitator (1 = Not at all effective to 5 = Very effective), and their agreement with the statement "Because of this session, I feel better able to perform my TA duties" (1 = Strong disagree to 5 = Strong agree). Open-ended questions asked participants to comment on what they felt to be the most useful elements of the workshop, the skills they gained as a result of attending the session, and suggestions for improving the workshop in the future.

Survey

Two e-mails inviting GTAs to complete an online survey were sent to all graduate students by the Graduate Assistants in the departments/faculties. The front page of the survey served as an information letter about the research and completing the survey was taken as consent to participate. Respondents were entered into a draw for one of two $200 gift certificates for a chain of shopping malls.

The survey consisted of 33 items, nine of which assessed the demographic characteristics of the participants. Three items determined the specific Lead TA workshops and CTL

programming the GTAs attended. One item asked if the GTAs had consulted individually with their Lead TA about their TA role. Three items assessed whether or not the TAs had accessed resources from their department/faculty's Lead TA website and, if so, which resources they accessed as well as the helpfulness of the resources (1 = Not at all helpful to 5 = Very helpful). Sixteen items asked them to rate their agreement (1 = Strong disagree to Strongly agree) with statements about the impact of the Lead TA workshops on themselves (5 items), their students (4 items), and their TA supervisors (3 items), as well as the impact of the Lead TA program generally on their department/faculty (4 items). Finally, one item asked if they would be willing to take part in a follow-up focus group.

Focus Groups

Those who expressed interest in participating in focus groups were e-mailed an invitation by a member of the research team. Focus groups consisted of three to five participants who each received a twenty-dollar gift certificate for restaurants on campus and a pizza lunch. Focus group questions asked GTAs to describe the impact the program had on themselves, the undergraduate students they instruct, their TA supervisor, and their department or faculty in general. A final question asked about improvements that could be made to the Lead TA program.

During focus groups, participants were provided with an information letter and consent form to read and sign and a brief demographic questionnaire to complete. All interviews were audio-recorded and partially transcribed. Thematic analysis (Miles & Huberman, 1994) was used to analyze and categorize data into recurring patterns based on our research questions and the intended program outcomes.

Results

Reaction Evaluation

The closed-ended items from the reaction evaluations are addressed in this section whereas the results of the open-ended items are addressed below with the focus group findings. The results of the reaction evaluations were very positive, with approximately 90% of GTAs who completed an evaluation for a Lead TA workshop rating the sessions as quite to very useful, the Lead TA as quite to very effective in their role as facilitator, and also agreed or strongly agreed that they were better able to perform their GTA duties because of the workshop (see Table 3).

Table 3
Percentages for Reaction Evaluation Rating Scales

Items	*n*	Percentages
Overall usefulness of the workshop	263	89.7% responded *quite* or *very useful*
Overall effectiveness of the workshop facilitator	243	93.9% responded *quite* or *very effective*
Because of this session, I feel better able to perform my TA duties	226	92.5% responded *agree* or *strongly agree*

Note. The rating scales were *Not at all useful* (1) to *Very useful* (5), *Not at all effective* (1) to *Very effective* (5), and *Strongly disagree* (1) to *Strongly agree* (5), respectively.

Survey

The majority of GTAs felt that the Lead TA workshops had an impact on them as TAs. Specifically, over 70% of survey respondents agreed (i.e., rated as agreed or strongly agreed) that because of attending Lead TA workshops they were more confident as TAs as well as more prepared for, and knowledgeable about, their roles (see Table 4). A majority also indicated that they had met TAs at the workshops that they had not met previously and were more knowledgeable about teaching in their disciplines because of the workshops.

The majority of GTAs also felt the workshops had an impact on their undergraduate students. That is, 60% to 70% of respondents agreed that, because of the workshops, they were able to help their students be more confident in their academic abilities and were better able to support and engage their students in their learning. Roughly half also agreed that they were more focused on helping students learn than covering the content.

Overall, there was less agreement, however, as to the impact of the workshops on GTA supervisors' perceptions of TAs or the effect of the Lead TA program generally on the department/faculty. Specifically, fewer than half of respondents agreed that their TA supervisor: (1) felt that they (the GTAs) were more knowledgeable about their TA role, (2) seemed more confident in the GTA's ability to perform their TA duties, or (3) was comfortable delegating responsibility to the GTAs as a result of them attending the Lead TA workshops.

Table 4

Percent Agreement (Agree or Strongly Agree) for Survey Items Assessing the Impact of the Lead TA Workshops on the TAs themselves, their Students, their TA Supervisors, and their Department/Faculty

Items[1]	*n*	% Agreement
Impact on the TAs		
I was more confident as a TA.	65	76.9
I felt more prepared for my TA role.	65	76.2
I was more knowledgeable about my TA role.	63	73.9
I met a number of TAs I did not know previously.	65	60.0
I was more knowledgeable about teaching in my discipline.	63	52.4
Impact on the Students		
I helped the students for whom I was a TA to be more confident in their academic abilities.	62	69.3
I was better able to support the learning of the students for whom I was a TA.	62	69.3
I was better able to engage the students for whom I was a TA in their learning.	62	61.2
I was more focused on helping the students for whom I was a TA to learn rather than covering the content.	64	53.2

Items[1]	*n*	% Agreement
Impact on the TA Supervisor		
My TA supervisor felt that I was more knowledgeable about my TA role.	56	46.4
My TA supervisor seemed more confident in my ability to perform my TA duties.	60	41.6
My TA supervisor seemed more comfortable delegating responsibilities to me.	60	38.3
Impact on the Department/Faculty[2]		
There are more departmental/faculty resources to support the TAs (e.g., handbooks, websites).	65	53.9
There seems to be a more positive TA environment in my department/faculty.	65	47.7
Faculty members in my department/faculty seem more aware of the TA's training needs.	65	38.5
A closer TA community in my department/faculty developed.	63	30.1

Note. [1]Each item was preceded by the phrase "As a result of attending the Lead TA workshops in my department/faculty," and rated on a 5-point Likert scale (1 = *Strongly disagree* to 5 = *Strongly agree*). % Agreement is the aggregate of the percentage of respondents who answered *Agree* or *Strongly* Agree. [2]Each item was preceded by the phrase "Because of the Lead TA program in my department/faculty," and rated on the same scale.

Further, fewer than half of respondents agreed that there was a more positive GTA environment, more awareness among faculty members as to GTA's training needs, or the development of a closer GTA community, and only slightly more than half agreed that there were more resources to support GTA development as a result of the Lead TA program. Similarly, only roughly one third of GTAs reported accessing resources from their Lead TAs' website (36.9%) but, of those GTAs who accessed the resources, 81.8% indicated that they were *quite* or *very* helpful.

Focus Groups and Reaction Evaluations

Four key themes were found through analysis of the examples and experiences shared by participants in the focus group interviews and open-ended reaction evaluation questions. The first three themes include reported gains in GTAs' (a) knowledge of the GTA role in the department or faculty, (b) pedagogical content knowledge, and (c) classroom management skills when facilitating disciplinary tasks and discussions. The fourth theme includes suggestions to improve the program for future iterations. Each theme is addressed in turn below, and quotes are provided to illustrate the key ideas. Participant quotes are identified by department or faculty, and the codes "FG" and "RE" are used to indicate whether the quotes are drawn from the focus groups or reaction evaluations[4].

[4] The identifying qualifiers of department/Faculty and code of "RE" or "FG" demonstrates the variety of respondents for each theme.

Increased Knowledge of the GTA Role in the Department or Faculty

A recurrent theme that emerged during conversations with GTAs relates to how the Lead TA Program helped to clarify what it means to be a GTA specifically in the context of the department or faculty: "[the workshops] helped to demystify our position and role in the department and reduce the possible anxieties associated with it" (English, RE). Despite having also attended campus-wide orientations for teaching assistants, some GTA participants asserted that they appreciated the discipline-focused preparation offered by the Lead TA because it conveyed critical departmental policies and information: "When I went to the Lead TA workshop, I was more engaged because everyone had the issues I am facing or will be facing because we're all from the same faculty. We're thinking in the same way. We're teaching the same thing." (Engineering, FG).

For many GTAs, Lead TAs offered the first, concrete introduction to their roles and responsibilities as GTAs and played an important role in their socialization to the teaching culture of the department. Many participants further reported that the program filled a departmental void in GTA training because either their department did not previously offer any training for GTAs or because Lead TAs were available to offer support and guidance in a way that faculty members could not because of research and teaching duties: "[My course coordinator] was so busy. She definitely didn't have time to teach us those skills the Lead TA program went over with us, so I was really grateful there was a dedicated person whose job it was to actually do that." (Science, FG).

The fact that this socialization to the disciplinary teaching culture occurred in a peer environment was also significant for many participants. One GTA described the sense of security that stemmed from being able to turn to a peer for feedback rather than a faculty member:

> I was very anxious about having to be a TA this year because I had never taught and felt I did not know enough. The workshops … made me feel empowered and gave a point of reference regarding my concerns. It also meant that in case I was really lost, I could go to [the Lead TA] for help without having to lose face in front of the instructor or even if I had trouble with the demands of the instructor. (Philosophy, RE)

Increased Pedagogical Content Knowledge

A second important finding to emerge from the focus group data is that some graduate students commented and reflected on teaching approaches specific to their discipline. This was a strong trend to emerge in the comments shared by graduate students who attended workshops offered by departmental-level Lead TAs, but the same trend was not seen among participants who attended workshops offered by faculty-wide Lead TAs. Specific examples cited by GTAs around this theme reflect an understanding of undergraduate students' learning needs in the discipline coupled with a desire to enhance that learning. Many GTAs reported gains in knowledge around which teaching strategies to mobilize in the classroom when teaching core disciplinary concepts, such as teaching students how to write effective essays by first teaching them how to use brainstorming techniques or how to employ concept mapping to better organize their ideas before writing.

GTAs further reported that Lead TA workshops helped them to be able to identify the importance of core assignments and readings in the discipline and how to articulate to students the skills to be gained as a result of completing this work. For example, one GTA disclosed that "I'm more confident when it comes to articulating the benefits and the value of writing a philosophy paper because we brainstormed this during a group discussion in a Lead TA workshop" (Philosophy, RE).

A final way in which Lead TA workshops promoted PCK among GTAs was by encouraging them to unpack complex disciplinary concepts with the aim of communicating these ideas to an undergraduate audience. According to one participant, "I learned how to identify what I now do automatically that my students are learning for the first time" (Philosophy, RE). Some Lead TA workshops espoused disciplinary communication competence by asking participants to unpack core concepts in the discipline with undergraduate audiences in mind. One GTA disclosed that, despite her years of prior experience as a teaching assistant, Lead TA workshops helped her explicate core concepts in her field of literary studies:

> Even though I've held nine TAships, the Lead TA Program introduced new workshop topics that interested me, especially the topics geared towards the Humanities. The session on close reading was requested by many graduate students in our department and it was helpful because we have been doing [close reading] for so long we've forgotten how to introduce it to people. (English, FG)

Increased Classroom Management Skills when Facilitating Disciplinary Tasks and Discussions

A third theme to emerge in the qualitative data includes GTAs' reports of increased discipline-specific skills and knowledge when dealing with classroom tasks and discussions. For example, Lead TAs held workshops in two different departments in the Humanities focused on helping GTAs develop classroom management skills related to facilitating difficult discussions on topics such as race, culture, gender, and sexuality. One of these workshops was developed for a Women's Studies and English Literature audience, while the second was designed for graduate students in Philosophy. Participants' comments after attending these workshops reveal a mindfulness to the ways in which some concepts in the Humanities can be troublesome for students because of their potential to challenge previously held worldviews. For example, one GTA reported "being more sympathetic with students as they unlearn systemic privilege" (Women's Studies, RE).

GTA participants of these workshops further stressed how they learned the importance of seeing things from the student perspective. This newfound perspectival flexibility became particularly essential when facilitating student learning around highly identity-involving issues that trigger strong emotional responses. In fact, one GTA reported that the workshop on structural inequality and privilege provided "new ideas for addressing disruptions in class and correcting students with sensitivity" (Philosophy, RE). Another GTA who attended a Women's Studies workshop on privilege articulated that the session served as a "great reminder about calling in instead of calling out – I really needed that (both in the classroom and in life)" (Women's Studies, RE). These comments reflect an understanding of the need to support student learning through balanced and constructive feedback.

Participants of these workshops also reported gains in confidence in relation to classroom management: "We learned how to deal with situations, who to turn to, and became more comfortable" (Science, FG). Part of this confidence stemmed from listening to more experienced GTA peers share their stories about experiencing similar anxieties and challenges and how they learned to resolve these issues successfully: "The panel sessions helped me realize that even profs and experienced GTAs have difficulty with the things we do" (Science, FG). Another participant clarified that her newfound confidence stemmed from the fact that the Lead TA workshops adopted a constructive approach to resolving classroom management issues in that the Lead TAs "got us talking about solutions and got us sharing our different approaches with each other rather than just focusing on the problems" (Medicine and Dentistry, FG). For another GTA, the ability to manage difficult situations was bolstered by a reminder that reflection can be part of the process of classroom management: "I now know that it's okay to take time to reflect on how to best respond to problematic statements made in the classroom" (Women's Studies, RE).

Suggestions for Program Improvement

GTAs made two key recommendations to improve the program for future iterations. The first recommendation was to gain the support of faculty members to help legitimize the program within the department. Participants suggested that the program should reach out to teaching-award winning instructors to invite them to collaborate with Lead TAs in the future. According to one GTA, "[t]here are some very strong instructors in my department. I think it would be very helpful if they were to be involved in some of the workshops so they can share what they do in their class" (Science, FG). GTAs appreciated the presence of faculty members at Lead TA workshops because they enjoyed hearing their expertise and experiences on topics ranging of grading to classroom management.

Faculty involvement in marketing the program was also invaluable. Several Graduate Chairs helped promote the program by sending emails to faculty and graduate students in the department. According to GTA participants, these emails helped to articulate the importance of the program and impacted their decisions to attend, particularly if the GTA's research supervisor privileged research over teaching development initiatives. One GTA shared her struggle with this: "My supervisor is against the program. He says I'm wasting my time. I think they [faculty] need to be made aware of the skills we're gaining [in the program] and how it's enhancing the graduate learning experience." (Medicine and Dentistry, FG). Another participant similarly stressed the notion that "faculty attitudes help legitimize the importance of teaching" and further added that "administration must be on board. If your department or graduate chair aren't on board with teaching, it will be difficult to drum up enthusiasm for the program" (English, FG).

A second recommendation made by participants involves recognizing and rewarding the pursuit of GTA training and teaching excellence in the department. In some departments, this took the form of including GTA training in the GTA contract, and one participant voiced her approval for formally legitimizing the hours GTAs devote to pursuing teaching development: "Making sure there are structures built in to make it easier for people to get training and feel like it doesn't always have to be voluntary but rather something that you're compensated for - I think that's really helpful" (English, FG). Furthermore, graduate students suggested formally recognizing faculty involvement in the Lead TA program by, for example, requesting that the department chair provide letters for faculty members to be included in teaching dossiers or teaching award applications.

Discussion

Our overall findings related to general instructional competence are consistent with the previous research on the Lead TA-type programs described earlier in this paper. GTAs in our study reported gains in their confidence, particularly in relation to their knowledge of and preparedness for the GTA role as well as their ability to support student learning. These findings are consistent with Pinder-Grover et. al.'s (2011) study about the impact of the Peer Teaching Consultant Program on GTAs at the University of Michigan, who found that GTAs who participated in the program reported increased confidence in their teaching and learned new strategies to improve student learning.

The lowest rated items on the survey asked participants about the extent to which the Lead TA Program impacted their TA Supervisors and their department/faculty. This is not surprising given that the impact of the program on GTAs and their students is much more proximal and immediate while the impact on the supervisor and department are much more distant and gradual. Focus groups further revealed variation in faculty members' attitudes towards the importance of GTA training. Faculty attitudes help shape the teaching culture of a department, and beliefs that research is more important than teaching when it comes to the professional development of graduate students will take time to shift (Marincovich, 2007; Rose, 2012). Additionally, given that the program has existed on our campus for only two years and most departments have had a Lead TA for one year, this finding is not entirely unexpected. The fact that several of the focus group participants spoke positively of the sense of community the program engendered in their departments suggests that the program is taking an important step in the right direction; however, there is still work to do in raising awareness about the program and its benefits before GTA communities can meaningfully develop in departments.

The focus group and workshop evaluation data revealed differences between GTAs who attended workshops offered at the departmental versus at the faculty-wide level. Department-wide GTAs were better positioned to explore how general instructional practices (such as effective grading or classroom management) intersect with the subject matter being taught (such as leaving marginal feedback on essays or drawing on feminist pedagogy to create safe classroom spaces). They were also better able to delineate the teaching of disciplinary topics, such as "how to teach close reading skills" or "how to teach critical thinking in philosophy tutorials."

An important component of PCK includes understanding why particular content is taught in the discipline as well as knowledge of the common issues—what Pace and Middendorf (2004) refer to as "bottlenecks" —that prevent student understanding in the field (Ronkowski, 1998; Shulman, 1986). The examples previously cited by GTAs who attended departmental Lead TA workshops reflect this broader definition of PCK by going beyond a mere knowledge of teaching strategies that are specific to the discipline. For example, participants' comments about being more patient with students who are learning about systemic privilege reflect a sensitivity to knowledge that is troublesome because of the way in which it challenges students' previously held beliefs.

On the other hand, participants of faculty-wide Lead TA initiatives consistently reported that the workshops were not discipline-specific enough and, as a result, too closely resembled the interdisciplinary training already offered through the university's CTL. To optimize the impact of the program in the future, it is imperative to understand why the program did not yield the same results across an entire faculty compared to a single department. An analysis of our data reveals two primary barriers to implementing the program at a faculty-wide level: (a) challenges related

to administrative tasks and (b) an inability to delve deeply into the taxonomy of pedagogical content knowledge.

Administrative Barriers

Because faculty-wide Lead TAs worked across four to eight departments, they experienced greater logistical challenges with building a cohesive GTA community. For example, during focus groups, participants of faculty-wide programs reported that they were unable to attend as many workshops as they would have liked because of scheduling constraints. Participants of department-wide programs, on the other hand, were able to provide input on what time slots would work best for training sessions. Working with participants to create a schedule that works for most graduate students is more realistic when done at a departmental level.

Another administrative challenge that can be gleaned from the reaction evaluations and focus groups relates to the marketing of the program. Some participants reported that they did not hear about the program until late into the academic year and this resulted in them missing workshops. This challenge relates, in part, to the fact that while departmental Lead TAs typically communicate with one graduate assistant or administrator to convey information to graduate students, faculty-wide Lead TAs had to coordinate messages with up to eight different administrators. This often resulted in delays to communication.

Challenges Related to the Taxonomy of Pedagogical Content Knowledge

Because faculty-wide Lead TA workshops occurred across a variety of departments and subjects, they were not able to move beyond the general and domain level PCK outlined by Veal and Makinster (1999). Table 5 offers a comparison of the number of general, domain, and topic-specific PCK workshops offered by faculty versus department-wide Lead TAs. In the interests of being inclusive to a wider audience, faculty-wide Lead TAs did not address topic-specific PCK during workshops because the information would not have been relevant to the entire group. Consequently, our focus group and workshop evaluation data drawn from participants of faculty-wide Lead TA training activities did not report gains in their ability to tailor instructional skills and knowledge to the teaching of distinct disciplinary topics. Participants in departmental Lead TA workshops, on the other hand, had opportunities to transfer their general PCK to both domain- and topic-specific contexts.

Table 5

Taxonomy of PCK covered in Year 2 Lead TA Workshops

Level	Faculty-wide *(offered by 5 Lead TAs in 5 faculties)*	Department-wide *(offered by 4 Lead TAs in 4 departments)*
General PCK	28	11
Domain	6	11
Topic Specific	0	3

Note. Workshops were categorized as general, domain, or topic-specific based on the titles and outcomes of the sessions. The table only includes workshops from year 2 of the pilot term to correspond with the reaction evaluation data used in this study which is drawn from year 2 workshops.

Recommendations

There are a number of factors that determine the success of departmental programs and the two recommendations offered by the participants of our study (i.e., to gain the support of faculty members and reward GTA excellence) are consistent with existing literature on best practices in organizing departmental-specific GTA training (Petrulis, et al., 1993; Ronkowski, 1998). An analysis of the results of our research, combined with our own reflections about the program, reveal two further insights to enhance the effectiveness of the program particularly when it comes to improving the disciplinary instructional competence of GTAs.

The first suggestion is to implement the program at a departmental rather than faculty level. Working with a smaller group of GTAs would help build a closer community among GTAs in the department, creating both formal and informal opportunities to discuss issues related to GTA development. It would also encourage a focus on topic-specific PCK and provide spaces for GTAs to discuss issues and strategies specific to the teaching of chemistry, math, or literature.

The second suggestion is to follow up on legacy projects to ensure that they are implemented in the department. The reaction evaluation, survey, and focus group data all indicated that the majority of GTAs found the Lead TA resources to be useful. The survey, however, indicated that just under half of participants accessed the resources created by Lead TAs. Because Lead TAs compile and submit their legacy projects at the end of their contract, they do not distribute the resources to TAs in their department themselves. One solution to this might involve featuring the resources on departmental websites and creating a sustainable plan for incorporating the material in future departmental GTA training initiatives.

Conclusion

The Lead TA Program described in this paper offers a cogent approach to enhancing the disciplinary instructional competence of GTAs. Implementing such a program at a research-intensive institution, however, is not without its difficulties, and an analysis of our findings provided insight into both the benefits and challenges of Lead TA-type programs. Recommendations to enhance the success of the program include (a) implementing the program at a departmental rather than faculty-wide level, (b) gaining the support of faculty members, (c) rewarding the pursuit of GTA training and teaching excellence in the department, and (d) creating a sustainable plan to ensure that resources created by Lead TAs continue to be used after their appointment.

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