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Developing Teaching Assistants as Members of the University Teaching Team

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Carrying out this project reinforced our commitment to the power of teamwork, both in the Teaching Assistant (TA) models we explored and within our own research team. Our team members brought diverse skills and perspectives to this study, along with unwavering commitment to its goals. We learned a great deal from each other.

Executive Summary

Responding to trends in research, National Survey of Student Engagement (NSSE) institutional data and curriculum renewal processes, several recent initiatives at the University of Toronto focus on the complementary role of the teaching assistant (TA) as part of a teaching team. Particularly, these initiatives focus on the establishment of learner-centred environments, support for deep student learning, and the development of core skills and competencies for both undergraduate and graduate students.

This study examined the influence of two teaching assistant (TA) models – the Advanced University Teaching Preparation Certificate (AUTP), offered by the University of Toronto’s Teaching Assistants’ Training Program (TATP), Centre for Teaching Support & Innovation, and the Writing Instruction for TAs (WIT) Program, offered in the Faculty of Arts & Science. Both of these TA models aim to improve undergraduate student learning by ensuring that TAs are integral members of the teaching team and that they receive sufficient training and guidance in order to effectively support deep student learning. Both of these TA models utilize peer training as a core dimension.

This study had three overarching goals:

- 1) Enhance undergraduate student learning by identifying the ways in which TAs can most effectively contribute to course development, instruction and assessment.
- 2) Enhance the development of TAs as future faculty members by identifying the structures, resources and experiences that most contribute to the development of a student-focused approach to teaching.
- 3) Enhance the culture of teaching at the University of Toronto by encouraging departments and instructors to think creatively about the opportunities they provide for TAs and the way in which they utilize teaching assistants in the classroom.

This research study utilized two data collection methods to implement a mixed-methods research design: surveys and interviews. One or both approaches were used to collect data from a range of participant groups in the AUTP and WIT programs: Course Instructors, Students, Teaching Assistants, and Peer Trainers, across seventeen WIT case study courses and nine AUTP case study courses. Data were collected at two time points: at the start of the case course (“initial”) and at the end of the case course (“follow-up”). The study was comprised of two broad streams of inquiry: 1) a TA learning stream, and 2) a student learning stream.

TA Learning Stream

This stream of inquiry investigated a range of TA learning themes such as the relationship between types of TA training, the degree to which a TA is included in the teaching team, and TAs’ approaches to teaching, writing and professional development. This study adapted Trigwell and Prosser’s (2004) Approaches to Teaching Inventory – Revised version (ATI-R) that is based on the theory that an information transfer/teacher-focused approach to teaching is associated with students adopting a surface learning perspective, while a conceptual change/student-focused approach to teaching is associated with students employing a deep learning approach.

The study found a relationship between breadth of teaching responsibilities and TAs’ approaches to teaching. TAs who reported a greater breadth in their teaching responsibilities, on average, reported a decreased use of an information transfer/teacher-focused approach at the follow-up than was reported at the initial data

collection. The study also found a relationship that approached our identified threshold of statistical significance between breadth of teaching responsibilities and use of conceptual change/student-focused strategies. TAs who reported a broader range of teaching responsibilities reported a greater use of student-focused strategies over time. Senior-level TAs in the study (Peer Trainers) reported using more of the conceptual change/student-focused approach both at the initial and follow-up data collection points than did other TAs.

This study also found that in utilizing trained TAs there is a greater likelihood that students will receive valuable formative and summative feedback and that consistent grading practices can be utilized within a course. Courses that incorporate some of the AOTP and WIT elements of best teaching practices are more likely to expose students to deep learning experiences, while TAs gain valuable skills in areas such as using effective assessment methods. These findings are encouraging in terms of the role that both the AOTP and WIT models play as formal opportunities for TAs to develop their philosophies, professional skills and identities as teachers. As well, the findings indicate that the creation of teaching teams are altering the ways in which TAs think about their collective and integrated roles, and that these may provide educational experiences for undergraduate students that are associated with deeper approaches to learning.

Student Learning Stream

The second stream of inquiry examined specific student learning experiences that addressed the role of TAs in supporting deep student learning and student development of core skills and competencies. To assess undergraduate student learning strategies, this study used Entwistle, McCune and Tait's (2000) Approaches to Study Skills Inventory for Students (ASSIST). This 52-item inventory is designed to assess students' learning approaches by measuring their score on three scales – deep learning, surface learning and strategic learning.

Quantitative findings from this study provided weak evidence that TAs' approaches to teaching and feedback were related to students' approaches to learning and writing. Qualitative data yielded some encouraging evidence that students' perceptions of TA feedback were positively associated with students' use of deep learning strategies. AOTP and WIT student interview data in particular highlighted positive learning processes at work. Students shared perspectives on their TAs' use of formative feedback and highlighted the ways in which they identified and discussed their own writing strategies in the WIT course (i.e., evidence of metacognition). Student interview data also included reflections on their learning experiences and the various roles of the WIT teaching team in this process.

The rich qualitative interview and open-ended survey data from all participants in this study illustrated the transfer of AOTP and WIT training elements (e.g., interactive teaching strategies, formative feedback) to actual pedagogical practices of TAs, which in turn created educational experiences conducive to deep student learning. TAs in this study also placed value on their development as teachers while also seeing the potential for the transfer of these valued skills (e.g., planning and time management) to future careers. Three major themes were identified with respect to TAs' pedagogical development as graduate students: (1) *Pedagogical practice*; (2) *Teamwork and collaborative cultures*; (3) and, *Career orientations and transferable skills*. TAs identified and discussed the applicability and practicality of their teaching and learning experiences to future contexts, including roles as future university faculty, but just as importantly, for other non-academic career roles.

Overall, data triangulation provided many examples of how the transfer of AOTP and WIT learning supported the integrated work of the teaching team, while also demonstrating how students reaped the benefits of specific educational experiences. Iterative assignments, specific feedback and interactive approaches

engaged students as learners, and student participants felt that such teaching approaches and strategies supported their learning.

Overall, this study may provide useful direction and build further momentum related to TA training and professional development. The report includes recommendations that flow from the study findings and have implications and relevance for university and college administrators, instructors and educational developers. Included in this list:

- Provide TAs with a broader range of responsibilities as part of the teaching team. By engaging in more aspects of teaching, TAs shift their approach to teaching to one less focused on information transfer and more focused on students' conceptual understanding of course content.
- Design and formalize training programs for TAs that provide opportunities for progressive development of pedagogical skill sets and create pedagogical leadership opportunities for graduate students (e.g., peer training roles).
- Create regular and ongoing opportunities for TAs to have both formal and informal discussions and meetings to discuss pedagogy and course design with Course Instructors and other TAs.
- Utilize TAs as important change agents in developing integrated teaching teams that can support student learning more effectively.
- Encourage and expand opportunities for TAs to invest in their development as teachers through participation in specific, intensive and ongoing formalized training programs such as AOTP and WIT.

Finally, the study identified a number of areas for further research that include: measures of actual writing (authentic assessment); identify factors and experiences that are most influential in senior-level TAs' ongoing development as effective teachers; continued investigation of a range of formal TA training programs, including peer training programs; and the development of TA pedagogical skill development and identity as teachers, and the transfer of these skills into future career paths.

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Introduction

Background

Recent research on teaching and learning in postsecondary education has highlighted the need to better understand the impact of faculty teaching on student learning (Christensen Hughes & Mighty, 2010; Kuh et al., 2005). More specifically, there continues to be an important debate about the effects of so-called “teacher-centred” and “learner-centred” approaches to classroom teaching (Barr & Tagg, 1995; Wiemer, 2013). For many, this is not just a debate about pedagogical methods but has been a philosophical debate about the purposes of education. Modern arguments for learner-centred education can be traced back to Dewey (1916) and continue to effect the way educators think about training and mentoring new generations of teachers in the postsecondary context.

Much of this research identifies pedagogical methods that promote a deep approach to learning and the techniques necessary to promote and develop core skills and competencies in students. In a parallel fashion, the literature on the development of teaching assistants has highlighted the need to focus on core competencies and a connection to the affective dimensions of teaching (Carroll, 1980; Staton & Darling, 1989; Prieto & Altmaier, 1994). This research has also emphasized the effectiveness of peer training for graduate students and the impact that this model can have on encouraging learner-centred approaches (Schönwetter & Ellis, 2010; Taylor, Schönwetter, Ellis & Roberts, 2008). Some have posited that the competency of teaching assistants is contingent on their amount of experience and their level of involvement in a particular course (Simpson & Smith, 1993).

After graduation, many graduate students enter professional labour markets characterized by the growth of short-term, contract and precarious labor in the higher education sector and within industry, non-governmental and government sectors (Ross, 2009). Shifting norms in undergraduate education are illustrated by the growing demand for movement in higher education from “teacher-centred” to “learner-centred” classrooms which creates new demands on the skills and training of the emerging professoriate. Austin (2002) notes that dominant paradigms around teaching and learning are in flux as institutions become more diverse, new instructional technologies emerge in the classroom, and public beliefs and expectations of the academy change. The combination of these macro-level dynamics creates an environment in which the training and socialization of graduate students, and the development of their professional identity, is increasingly important.

In the course of completing a doctoral degree, graduate students should ideally move in a developmentally strategic trajectory from a senior learner or strong student, to a colleague-in-training, and finally to being perceived as a junior colleague by their instructors (Marincovich, Prostko & Stout, 1998). While this socialization has long emphasized the skills and orientations of research, institutions and professional organizations such as the Canadian Association for Graduate Studies (Rose, 2012) are increasingly emphasizing teaching and an associated cluster of skills. Research demonstrates that professional development focused on teaching produces graduate student teachers who are reflective about teaching and more satisfied with their teaching (Crumley & James, 2009; Gilmore, 2009; McGoldrick, Hoyt & Colander, 2010). Importantly, it also provides opportunities for learning across the domains of professional development.

Responding to trends in research, National Survey of Student Engagement (NSSE) institutional data and curriculum renewal processes, several recent initiatives at the University of Toronto focus on the complementary role of the teaching assistant (TA) as part of a teaching team. Particularly, these initiatives focus on the establishment of learner-centred environments, support for deep student learning, and the development of core skills and competencies for both undergraduate and graduate students.

Overview of the Study

This study aimed to assess the influence of two teaching assistant (TA) models – the Advanced University Teaching Preparation (AUTP) Certificate, offered by the University of Toronto's Teaching Assistants' Training Program (TATP), and the Writing Instruction for TAs (WIT) Program, offered in the Faculty of Arts & Science. Both of these models are described in more detail in the next section. Each of these models aims to improve undergraduate student learning by ensuring that the TA is an integral member of the teaching team and that the TA receives sufficient training and guidance in order to effectively support students' deep learning and the development of core skills and competencies. To examine the effects of these programs, this study looked at both the TAs who received training and the students taught by these TAs.

This study also aimed to advance understanding of the relationship between deep student learning (at both the undergraduate and graduate levels) and approaches to teaching, given that "[o]ur ultimate goal is to have more faculty members adopt teaching approaches that are likely to foster deep approaches to learning" (Christensen Hughes & Mighty, 2010, p. 5). The two TA initiatives of interest aim to support a deep approach to student and TA learning and development in two ways:

- 1) By providing additional opportunities for students in undergraduate courses associated with these initiatives to experience deep learning through enhanced TA support; and
- 2) To provide TAs with a set of teaching skills and approaches that not only support student learning in these courses but also contribute to TAs' ongoing professional development. By supporting TAs in developing these skills and approaches, these two TA models are designed to promote the ability of TAs and potential future faculty to bring this deeper learning to their future teaching environments.

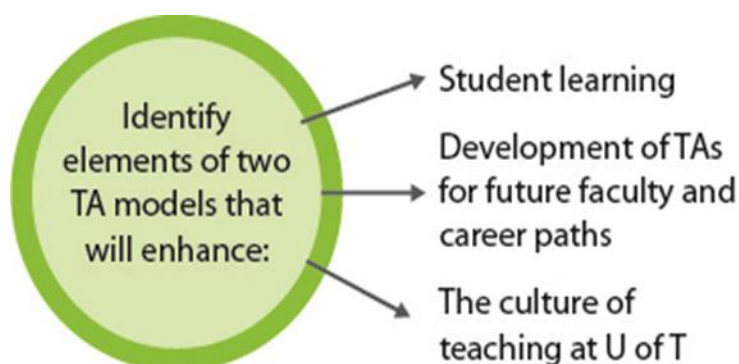
This study also identified the specific elements of TAs' interactions with students that supported deep student learning and the development of core skills and competencies. This study also considered the most effective means by which TAs can build a diverse pedagogical tool kit to respond to learner needs and develop their own skill set applicable across a wide variety of teaching and non-teaching contexts.

Research Goals and Questions

This study had three overarching goals as illustrated in Figure 1:

- 1) Enhance undergraduate student learning by identifying the ways in which TAs can most effectively contribute to course development, instruction and assessment.
- 2) Enhance the development of TAs as future faculty members by identifying the structures, resources and experiences that most contribute to the development of a student-focused approach to teaching.
- 3) Enhance the culture of teaching at the University of Toronto by encouraging departments and instructors to think creatively about the opportunities they provide for TAs and the way in which they utilize teaching assistants in the classroom.

Figure 1: Study Goals



This study contained two broad streams of inquiry. The first investigated a range of TA learning themes such as the relationship between types of TA training, the degree to which a TA is included in the teaching team, and TAs' approaches to teaching, writing and professional development. The second stream of inquiry examined specific student learning experiences that addressed the role of TAs in supporting deep student learning and student development of core skills and competencies. Each of these two streams of inquiry included a series of research question clusters as listed below.

1. TA Learning Stream:

Cluster One: TA Breadth of Responsibility and Approaches to Teaching

- a. To what extent, if any, is there a relationship between the breadth of TA teaching responsibilities and their approaches to teaching?
- b. How do TAs experience their involvement as members of the teaching team and how do they discuss this involvement in light of their approaches to teaching?
- c. Do Peer Trainers¹ differ from other TAs in their approaches to teaching?

Cluster Two: TA Professional Development: Writing

- a. To what extent, if any, is there a relationship between breadth of teaching responsibility, TA experience and TAs' perceptions of their writing?

2. Student Learning Stream:

Cluster One: Graduate Student Pedagogical Learning and Undergraduate Students' Approaches to Learning

- a. How do TAs articulate their approach to teaching in light of student learning?
- b. How do students reflect on their TA's approach to teaching?
- c. How do TAs articulate their professional development as a result of their TA experience?

¹ In this report, Peer Trainers are advanced doctoral-level TAs who peer mentor the WIT TAs and AOTP TAs. The next section provides a more detailed description of Peer Trainers in each of these two programs.

Cluster Two: Approaches to Teaching and Undergraduate Student Learning

- a. To what extent, if any, is there a relationship between TAs' approaches to teaching and students' approaches to learning?
- b. To what extent, if any, is there a relationship between students' perceptions of their TA's feedback and students' learning strategies?
- c. To what extent, if any, is there a relationship between students' perceptions of their TA's feedback and students' perceptions of writing?
- d. How do students discuss their learning processes?
- e. How do students think about teaching approaches in terms of their own learning, particularly as it relates to writing?

The main aim of both the AUDP and WIT models is to train participating TAs to become more effective teachers, and in the case of WIT, to be better teachers of writing. The primary training elements employed in both models (e.g., formative feedback, assignment development, interactive strategies) assist TAs and peer trainers in considering how they can intentionally shape courses, assignments and activities that can foster deeper approaches to student learning and the development of important skills (e.g., writing). As Entwistle (2010) notes, "The encouragement of deep approaches depends on designing teaching, assignments, and assessment that act synergistically to support student learning and understanding..." (p. 29). Trigwell's (2010) research demonstrates that these teaching skills and approaches, once learned, make TAs more effective teachers in a range of contexts, both during their time in graduate school and as they move into academic or other careers where teaching is an aspect of their work. In other words, the two University of Toronto TA models are intended to shape teaching practices in ways that enhance TA and peer trainer pedagogical learning, while hopefully enhancing student learning in both the immediate and the long term.

Theoretical Framework

This study draws primarily from four bodies of research related to teaching development in higher education:

- 1) Debates regarding learner- and teacher-centered approaches to teaching, informed by Trigwell and Prosser's (2004) empirical work on attitudes toward teaching.
- 2) The practical domain of teaching practice, embodied in the level and breadth of involvement of a TA in the design and delivery of a course or tutorial. In this study, we conceptualize this element as the "breadth of teaching responsibilities" held by teaching assistants (Simpson & Smith, 1993).
- 3) Core competency development as it spans the graduate student learner (TA) and undergraduate student learner distinctions. We focus our effort on examining communication as a core competency (Seifert, 2006) as it manifests in learners' perceptions of the writing process, with specific attention paid to writing anxiety, writing self-efficacy and metacognition toward writing.
- 4) The emphasis on the need for ongoing professional development of graduate students, and institutional responses to the need for professional development and identity formation among advanced students (Marinovich et al., 1998; Schönwetter & Ellis, 2010; Taylor, Schönwetter, Ellis & Roberts, 2008).

For the past several decades, the relevant literature has hosted a lively debate about the approaches to teaching that promote students' deep learning in the shifting contexts of higher education (Barr & Tagg, 1995; Entwistle, 2010; Entwistle & McCune, 2004).

Students who use a deep learning process seem to approach learning with an intention to understand whereas students who use a surface learning process focus their intention on reproducing information presented to

them (Entwistle & McCune, 2004). Thus, the discussion in the field has largely centered on the belief that if teaching and learning are both approached from a “deep” perspective, our institutions will be able to deliver a much more effective educational experience to students.

This study begins with the assumption that teaching assistants and teaching teams are essential to the goal of achieving deep student learning. However, one of the primary challenges in assessing TA roles and approaches to teaching is the inherent and dramatic variation in TA responsibilities and in the ways in which TAs and Course Instructors² interact and collaborate in developing and delivering a given course. Our research team recognized early in the data collection process that AOTP and WIT TAs had a wide range, or what we refer to as “breadth” of responsibilities, best described on a continuum of involvement (e.g., low, moderate, high and very high level of involvement).

TAs may, for example:

- a) Contribute to the development of assignments, tests and exams.
- b) Provide input into the design of their tutorial/lab sessions.
- c) Meet and communicate with students about the course outside of class sessions (e.g., in office hours or by email).
- d) Meet regularly with the course instructor to plan or discuss the course.

In this study we were also interested in core competency development as it spanned the graduate student learner (TA) and undergraduate student learner distinctions. Communication – reading, writing and speaking – is defined fairly interchangeably as an essential learning outcome (AAC&U, 2007), generic skill (Kear, 2001), a core skill (Paranto & Kelkar, 1999), or a core competency across a host of international studies (Seifert, 2006). For the purposes of this study we examined three key constructs related to writing: metacognition, self-efficacy and anxiety.

Allen and Armour-Thomas (1993) define “the common conception” of metacognition as “the knowledge and control individuals have over their own cognition and learning experiences” (p. 203). When it comes to writing specifically, metacognition deals with how students understand their own writing processes and how they adapt their processes to evolving demands. It is an essential part of Hayes’ (2000) model of cognition and affect in writing, which emphasizes the role of cognitive strategies in managing the complex relationship between the writer (including motivation, memory and cognitive processes) and the “task environment” (composed of the audience, collaborators, the text to be created, and the composing medium). In light of Lavelle and Bushrow’s (2007) observation that “writers at all levels rely on strategies, or patterns of writing tactics, to achieve their writing goals” (p. 808), we examined learners’ perceptions of using metacognitive strategies within the writing process.

First articulated by Albert Bandura in 1977 (cited in Bandura, 1995), self-efficacy has been defined as “composed of confidence in the ability to accomplish particular tasks and perform particular skills...[i]t is also composed of confidence in self-regulatory strategies to accomplish those tasks” (Jones, 2008, p. 230). In terms of student writing, self-efficacy centres on whether or not students believe they can accomplish a given writing task and whether or not they are confident that their chosen strategies will be effective. Despite the prevalence of self-efficacy in studies of writing ability (Jones, 2008), it has been defined in terms of both task-and-skill as well as regulatory self-efficacy, which can provide for a lack of conceptual clarity. Given the accompanying focus on metacognition, this study examined regulatory self-efficacy, the conceptualization closest to the idea of metacognition.

² In this report, we use the term “Course Instructor” to refer to the individual with the sole responsibility to deliver and manage a course. Typically, this person is a faculty member, but may also be a sessional instructor or, in some cases, a graduate student.

Inventories that assess student skills and strategies have generally paid little attention to the role of emotion in the learning process, with self-efficacy, anxiety and fear of failure as the only exceptions (Entwistle & McCune, 2004; Lavelle & Guarino, 2003). Most inquiry into the relationships between anxiety and writing practice has focused on how it can negatively affect student writing (Martinez, Kock & Cass, 2011). Anxiety also appears to be negatively related to self-efficacy; those with low self-efficacy are more prone to experience stress and anxiety in association with their academic work (Jones, 2008; Martinez, Kock, & Cass 2011; Prat-Sala & Redford, 2012). Other negative effects include unpleasant feelings, nervousness and tension, as well as unproductive writing approaches like avoidance, withdrawal and procrastination (Martinez, Kock & Cass, 2011).

Although scoring student writing assignments may be a more authentic assessment of writing skill, the theoretical framing for this study allowed for a multi-pronged examination of learners' perceptions of engaging in the writing process.

Report Framework

The previous section provided an overview of the theoretical literature guiding this study, as well as a description of the key study research questions. The next section describes the Advanced University Teaching Preparation (AUTP) Certificate and the Writing Instruction for TAs (WIT) Program, including the specific training components and pedagogical approaches utilized by each model. It is important to understand the different approaches of each program in order to appreciate their potential impact on the teaching and learning of TAs and students. The Methods section of the report provides an in-depth discussion of the methodological approach to the study, particularly its mixed-methods research design. This discussion includes elaboration on the survey instruments used for the study: the Approaches to Teaching Inventory (ATI), the Approaches and Study Skills Inventory for Students (ASSIST), and a new instrument designed to assess student writing anxiety, self-efficacy and metacognition. We also describe the selection protocol and interview design for the qualitative aspect of the study. The Results and Discussion section reports on the findings and results of the study and is organized according to the two inquiry streams and four clusters of research questions previously described. Both qualitative and quantitative research findings are complementary and integrated in the findings and conclusions. The final section includes conclusions and recommendations for both pedagogical practice and further research.

Description: Two Teaching Assistant Models

For a number of years, the University of Toronto has been engaged in efforts to improve the professional development of graduate students, especially as it relates to pedagogical development. Initiatives in this area are institution-wide, divisional, and offered at the local department/unit level. Programs range from discipline-specific pedagogical training (e.g., Professing Literature, in the Department of English, and Prospective Professors in Training, offered through the Faculty of Applied Science & Engineering), to more broad-based opportunities (e.g., Teaching in Higher Education, a 12-week course for senior graduate students). There is also a continued emphasis on developing a wider professional skill set for graduate students, including research, grant writing and communication skills (e.g., the Graduate Professional Skills program administered through the School of Graduate Studies).

The AUTP and WIT programs are examples of two specific TA training programs operating at the University of Toronto. This section elaborates on the institutional context, program goals and formats for both programs. The AUTP and WIT programs draw from identified best practices in instructional design for undergraduate education (Davis, 2009; McKeachie, Vinicki & Hofer, 2006; Nilsson, 2010). These practices include the use of:

- a) Formative feedback – the provision of constructive feedback to allow for ongoing improvement and overall enhancement of student learning. Formative feedback is provided by both the instructor and the TA and involves opportunities for structured peer-based feedback.
- b) Scaffolded learning – the breaking down of conceptual material into progressively more complex components to achieve deeper understanding of the totality of the concept or content. When scaffolding is integrated into written work and assessments, these are referred to as “iterative” or “staged” assignments.
- c) Approaches to lesson design – this draws from theories of scaffolded learning and includes an emphasis on instructional methods that develop learners’ knowledge, skills and experiences, the use of modeling to demonstrate and enhance learning, and the inclusion of various instructional approaches to motivate learners and engage them in meaningful ways. In peer-based training, modeling is also used to develop teaching skills and competencies.
- d) Interactive teaching methods – these strategies generate participatory, cooperative and collaborative learning environments where discussion is valued.

Advanced University Teaching Preparation Certificate (AUTP)

The AUTP is one of two certificates offered through the University of Toronto’s Teaching Assistants’ Training Program (TATP).³ The TATP was originally developed to meet the job training mandate for teaching assistants as determined through the teaching assistant union’s collective agreement with the University of Toronto. Its mandate has since expanded to meet the growing needs of graduate students and TAs as they take on teaching positions within the University and in preparation for future academic and non-academic careers.

The TATP is a peer-based program operating out of the Centre for Teaching Support & Innovation (CTSI) and employing 15 senior doctoral students from a wide range of disciplines who provide training and mentoring to other graduate students, teaching assistants and graduate course instructors. The TATP offers workshops and consultations and performs in-class teaching observations for graduate students across all departments of the University of Toronto’s three campuses. All TATP trainers and coordinators receive intensive training from the University of Toronto’s Centre for Teaching Support & Innovation before beginning their TATP appointments. Training addresses a wide range of topics and issues, including teaching strategies and techniques, workshop design and delivery, conducting consultations and providing feedback, and developing teaching philosophies.

Recognizing the need for more in-depth pedagogical training, the TATP expanded its offerings in 2006 to include the AUTP certificate. The AUTP certificate requires participants to complete ten two-hour workshops (four of which must be core pedagogical training⁴), as well as completion of a teaching dossier and practicum training, which consists of in-class teaching observation⁵, micro-teaching⁶ or a scholarly pedagogical paper. AUTP participants have up to two years to complete their certificate.

The AUTP certificate provides opportunities for graduate students to prepare for careers in academic teaching. Through participation in the AUTP certificate program, graduate students have access to a supportive

³ For more information on the TATP, visit <http://www.teaching.utoronto.ca/gsta.htm>

⁴ Core pedagogical training addresses core teaching skills that are essential across a variety of teaching contexts (e.g. feedback, facilitation, lecturing, pedagogical design).

⁵ In-class observations involve goal setting around areas for improvement, peer observation of teaching contexts (tutorials, labs, lectures), and individual consultation, feedback and problem-solving around teaching challenges.

⁶ Micro-teaching is a simulated teaching demonstration exercise whereby AUTP participants deliver a lesson to a small group of peers and two TATP peer trainers. In micro-teaching, participants are given the opportunity to observe teaching and have their own teaching observed and to provide and receive feedback.

environment through which to expand their understanding of teaching and learning, as well as the opportunity to practice their classroom skills. As part of their program, participants are also required to submit a written reflection that documents their experience in the program and the practical application of learned teaching strategies. These reflections also address the value and overall impact of the certificate for individual participants.

The TATP offers a variety of streams within the AOTP certificate. One facet of programming is an emphasis on classroom technology and online teaching formats. A second major facet of programming focuses on interactive and collaborative teaching techniques. A third facet focuses on best practices in course design, including syllabus, lesson and assessment planning. Finally, the AOTP provides workshops and roundtables that address more general professional development concerns, like developing a teaching dossier and strategies for discussing teaching in job interviews.

In essence, the AOTP certificate aims to guide graduate students in their development as junior faculty, specifically in relation to their teaching responsibilities.⁷

Writing Instruction for TAs (WIT)

WIT⁸ is an initiative of the Faculty of Arts & Science at the University of Toronto. The program was first developed as a curriculum renewal initiative by a department within the Faculty. Recognizing the effectiveness of the model for enhancing writing across the curriculum and the need for more intensive instruction in writing at the undergraduate level, the Faculty chose to expand the offering more broadly across the division. Instead of offering one-size-fits-all courses in academic writing, WIT integrates writing into general coursework, allowing academic units to define what types of writing their students need to do – and how the related writing instruction should be structured.

Given the integral role that TAs play in instructional support and delivery in the undergraduate curriculum, WIT was designed to provide specialized training and support in writing instruction to TAs. WIT began as a pilot in two departments (Geography and Near and Middle Eastern Civilizations) and now has approximately 20 units and 70 courses participating across the Faculty.

WIT provides training to course TAs in writing instruction, such as how to provide formative feedback to students on writing assignments and how to integrate writing activities into tutorials/labs. Units that participate in WIT receive funding for a senior PhD student to become a Lead Writing TA (LWTA),⁹ who provides training and support to course TAs in designated WIT courses within their department. The LWTAs receive intensive summer training from Arts & Science faculty and CTSI staff. Throughout the academic year, they also receive ongoing training and mentoring from the WIT coordinator (one of the Faculty of Arts & Science writing specialists) in all aspects of writing instruction as well as peer-based training and workshop design. While each unit's WIT plan varies according to the goals of the particular discipline and unit, there are several fundamental components that WIT seeks to promote. For example, a strong emphasis is placed on providing formative feedback on writing. To support this goal, TAs in WIT courses are trained in assessment of writing and are guided through benchmarking¹⁰ sessions that collaboratively establish and clarify assessment goals.

⁷ For the purposes of this report only, we refer to TATP staff as AOTP Peer Trainers to remain consistent with the program name under study. AOTP peer trainers are senior-level, highly trained TAs who peer mentor graduate students participating in the AOTP certificate program.

⁸ For more information on WIT, visit <http://www.artsci.utoronto.ca/faculty-staff/wit/?searchterm=wit>

⁹ Following from our description of AOTP Peer Trainers, throughout this report we define LWTAs as Peer Trainers who also oversee and act as peer mentors to WIT TAs.

¹⁰ Benchmarking, or moderated marking, promotes consistency in grading across multiple sections of a course and ensures that students receive constructive feedback on their written work. Benchmarking also solidifies and promotes an emphasis on learning objectives and core skills and, in the case of WIT, communication skills through writing.

The WIT program is designed to influence the development and delivery of curriculum at the department/unit level. To participate in WIT, units must develop departmental writing goals for undergraduate students. Course instructors, in turn, work closely with the WIT Coordinator and the LWTA to design assignments and instructional activities that help students achieve course and departmental goals for writing. This approach allows for writing instruction to vary across disciplinary contexts while promoting and instilling core pedagogical skills in TAs and meeting broader faculty-wide curricular goals.

One of the ways that curricular goals are met is by developing and hopefully sustaining cultures of writing within departments and programs. WIT has served to spawn discussions of writing within the undergraduate curriculum, while also requiring the establishment/formulation of writing goals by the participating departments.

As members of a teaching team, WIT participants (TAs and LWTAs) receive focused and ongoing training and support that allows them to develop professional responsibility and competencies in teaching writing skills and assessing written work.

Methods

Research Design

Mixed-methods design intentionally integrates qualitative and quantitative data and analysis (Teddlie & Tashakkori, 2003), although the points at which researchers integrate the methods (Creswell & Plano Clark, 2007; Tashakkori & Creswell, 2007) and the purpose for using this research design may vary (Greene, Caracelli & Graham, 1989).

More than the practicalities of how data are collected and integrated, mixed-methods inquiry is also a way of thinking. According to Jennifer Greene (2005), a leading mixed-methods educational researcher, mixed-methods thinking:

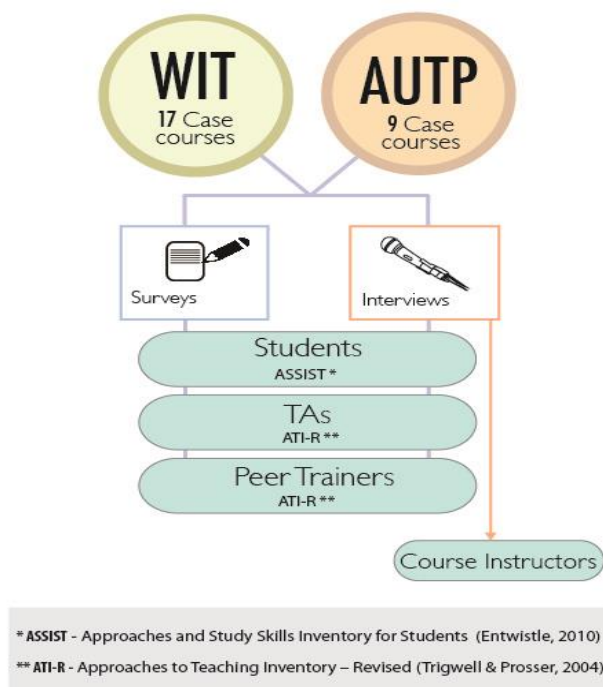
[A]ctively includes, even welcomes multiple methodological traditions, multiple ways of knowing and multiple values stances..... A mixed method way of thinking seeks better, more comprehensive understanding of educational phenomena, understanding that is woven from strands of particularity *and* generality, contextual complexity *and* patterned regularity, inside *and* outside perspectives, the whole *and* its constituent parts. (p. 207)

For this study, we used an integrated research approach to frame research questions suited to quantitative and qualitative methods, with the main goal of using the qualitative data to elaborate, enhance, illustrate and clarify the quantitative data (Greene, Caracelli & Graham, 1989). Specifically, this study is concerned with both the potential relationship between training initiatives and TAs' approaches to teaching, as well as how these relationships were experienced by individual TAs. A design was needed that would allow an investigation into the extent to which relationships were present (i.e., collecting quantitative data using survey instruments), as well as a way of understanding what happened in a training initiative that contributed to TAs approaching their teaching differently (i.e., collecting qualitative data through face-to-face interviews). By "juxtaposing different lenses, perspectives and stances" (Greene, 2005, p. 208), the mixed-methods research design and commensurate way of thinking allowed the research team to develop a more nuanced understanding of how TAs come to develop their attitudes toward teaching and how their teaching approaches contribute to the learning strategies of students. In short, mixed-methods allowed for the assessment of both the *what* and the *how* of the four research question clusters. We present the study's findings first by describing the relationships present between phenomena and second by delving into the mechanisms and nuances within those relationships. We integrate these two sets of findings within the Results and Discussion sections of this report.

We utilized two data collection methods to implement a mixed-methods research design: surveys and interviews. Both approaches were used to collect data from a range of participant groups in the AOTP and WIT programs. The following section details our process for recruiting participants to complete the surveys and interviews. We then elaborate on the instrumentation selected and developed for the study. In Figure 2 we illustrate the two TA models, participants in the study and the data collection methods. In Table 1 we present the number of participants in the study and the response rate for the two data collection methods. We conclude the section by describing the analytic process engaged to examine the research questions.

Finally, the Office of Research Ethics at the University of Toronto approved this research study on November 2, 2010 (Protocol # 25570).

Figure 2: Study Participants and Methodology Overview



Participant Recruitment

We next report on AOTP and WIT study case course selection procedures as well as interview recruitment procedures for both programs.¹¹ We explain the survey recruitment procedure more fully within the Survey Administration section.

¹¹ Throughout this report we refer to “initial” and “follow-up” data collection time points for both WIT and AOTP case study courses. “Initial” refers to either the period August-September 2011 (for Fall and full-year courses) or early February 2012 (for Spring courses). The “follow-up” data collection time period refers to end of the Fall 2011 (November-December) or Spring 2012 (April-May) terms, depending on whether the course was a half- or full-year course.

WIT Recruitment

Case course selection. We purposively sampled case study courses from the WIT program from across the Faculty of Arts & Science and used three criteria to guide our selection:

- 1) courses needed to have a reasonably large student enrolment ($n > 100$);
- 2) courses needed to have large TA numbers ($n > 3$);
- 3) courses needed to represent the four divisions (social sciences, humanities, physical sciences and life sciences), with the goal of including Fall and Spring half-year courses and year-long courses.

Emails were sent to the 17 Course Instructors whose courses met all three criteria to participate in this study. All seventeen instructors agreed to include their courses in the research.

TA interviews. Fifty-one WIT TAs from all 17 WIT case study courses were invited via email to participate in a follow-up interview only (at the end of the WIT course in which they were involved) and ten TAs participated (representing ten WIT case study courses).¹²

All 15 LWTAs who had been involved in the WIT program were invited to participate in an interview at both initial and follow-up time periods.¹³ Fourteen LWTAs were interviewed at the initial stage of the study, and one person declined due to timing constraints. All 15 LWTAs participated in the follow-up interview. Each participant received \$20 compensation for each of the two interviews they completed.

Student interviews. Undergraduate students who completed both initial and follow-up surveys ($n = 363$) were invited via email to participate in an interview and 127 students expressed an interest. We conducted a random systematic sample from this list of interested students and ensured that all 17 WIT case study courses were represented. The research team used the University of Toronto Learning Portal – a web-based course management tool – to obtain student contact information. Use of this portal for student recruitment purposes was approved by the Faculty of Arts & Science and included in our Research Ethics application.

Course Instructor interviews. All 17 WIT case study Course Instructors were invited to participate in an interview at two time points: initial and follow-up. We conducted 15 interviews during the initial course phase and 14 interviews at the follow-up time point. These Course Instructors did not receive any compensation for their time.

AUTP Recruitment

Case course selection. Any TA participating in the AUTP certificate program at the time of the study was invited to participate. If TAs agreed to be included in the study, we contacted the associated course instructor to obtain their permission to add the course to the study sample. Nine AUTP TAs and their Course Instructors agreed to participate in the case study portion of the research.

TA interviews. AUTP TAs¹⁴ were invited to participate in two interviews (initial and follow-up). All nine AUTP TAs completed both the initial and follow-up interviews. All 14 Peer Trainers for AUTP were also invited to

¹² WIT TAs were interviewed only once in this study, at follow-up, in large part due to participant time constraints as well as study resource issues.

¹³ LWTAs participated in two interviews in large part because they oversaw much of the WIT program roll out in their departments and could provide important insights at both of these time points.

¹⁴ As noted previously in this report, AUTP TAs were enrolled in a two-year certificate program, but use of the phrases “initial” and “follow-up” in this section and elsewhere refers to the timelines of the entire study and not the specific time points of their AUTP certificate program.

participate and all completed the initial interview. Thirteen Peer Trainers were interviewed at the follow-up phase of our study. All AOTP TA participants received \$20 compensation for each of the two interviews.

Student interviews. One hundred fourteen undergraduate students who completed the follow-up survey in the nine AOTP case study courses were invited to participate in an interview. We faced student recruitment challenges, mainly due to timing (end of course term) and we received responses from five students in total and opted to conduct interviews at one time point only: at course follow-up. On a positive note, we interviewed students who represented five different AOTP courses, out of nine. Our goal for both AOTP and WIT had been to interview approximately 25 students, one from each of the case study courses, and we reached 22 students, very close to our initial study target. Students received \$10 compensation for their interview.

Course Instructor interviews. All nine AOTP Course Instructors were invited to participate in both an initial and follow-up interview and all instructors participated in both interviews. As noted in Table 1, although there were nine AOTP case study courses, we conducted an interview with two Course Instructors from one course, which resulted in ten participants. These AOTP Course Instructors did not receive any compensation for their time.

Survey Recruitment and Administration

Student surveys. Campus Labs, a third-party data collection organization, administered the survey on our behalf and sent the online survey link to undergraduate students in the nine AOTP case study courses and 17 WIT case study courses. Students were invited to participate in the study after the University of Toronto's add/drop date for that term. The research team felt that this sampling strategy might avoid including students who had dropped the class. Thus, initial data collection invitations were sent in late September 2011 (for fall and full-year courses) and early February 2012 (for spring term courses). Students who completed the initial online survey were entered into a draw to receive a \$10 Amazon.ca gift card (with a 1 in 4 chance of being selected). Follow-up data collection invitations were sent at the end of the Fall 2011 and Spring 2012 terms. Students who did not participate in the initial data collection were invited to participate in the follow-up data collection which would allow the research team to conduct cross-sectional analyses as well as longitudinal analyses. Students who completed the follow-up survey were entered for a gift card draw. All student respondents were entered into a draw for a chance to win one of four iPads.

Student survey response rates were similar at the initial phase across both WIT (28%) and AOTP (29%) and differed slightly at follow-up: WIT (31%) and AOTP (26%).

TA surveys. Campus Labs also administered the survey to both WIT TAs and AOTP TAs. To maximize the number of TAs in our sample, we included data from two versions of the TA survey. Versions 1 and 2 of the TA survey were essentially the same, with version 2 having more items that elaborated on the breadth of teaching responsibilities, interactions with Course Instructors and interactions with other TAs. TA respondents were compensated \$10 for completing each of the surveys. WIT TA response rates at initial (41%) and follow-up (33%) differed from AOTP initial response rates, of 51% (v1) and 72% (v2), and follow-up (22%). Data were collected from WIT TAs at the beginning and end of the WIT course for which they were a TA. AOTP TAs followed a similar data collection timeline, however this group was invited to participate in mid-summer 2011 once participants had entered the AOTP certificate program. The AOTP TA follow-up data were collected during Spring 2012. Please see Table 1 for more detailed recruitment information and response rates.

Table 1: Participant Recruitment and Response Rates

STUDENTS	WIT 17 Case Courses		AUTP 9 Case Courses	
	SURVEYS	INTERVIEWS	SURVEYS	INTERVIEWS
Invited	n= 2793	n=363	n= 436	n= 114
Initial	n= 779 (28%)	n/a	n=1 28 (29%)	n/a
Follow-up	n= 862 (31%)	n= 17	n= 114 (26%)	n= 5
TEACHING ASSISTANTS				
Invited	n= 153	n= 51	n= 90	n= 9
Initial	n= 62 (41%)	n/a	n= 46(v1)* (51%) n= 65(v2)* (72%)	n= 9
Follow-up	n= 51 (33%)	n= 10	n= 10	n= 9
PEER TRAINERS				
Invited	n= 15	n= 15	n= 14	n= 14
Initial	n= 14	n= 14	n= 14	n= 14
Follow-up	n= 15	n= 15	n= 13	n= 13
COURSE INSTRUCTORS				
Invited	n/a	n= 17	n/a	n= 10**
Initial	n/a	n= 15	n/a	n= 10
Follow-up	n/a	n= 14	n/a	n= 10

* v2 is a modified version of v1 with more elaborated questions on the breadth of teaching responsibilities, interaction with Course Instructor, and interaction with other TA items

** While there were 9 AUTP Case Courses we had 2 Course Instructors interviewed for one course

Quantitative Instrumentation

The online TA and student surveys consisted of items that measured a number of different constructs. The TA surveys included information on the TA's experience as a member of the teaching team and his or her approach to teaching. WIT TAs also answered questions about how they perceived their writing process. Students were asked about their approach to learning, how they perceived feedback from their TA and how they perceived their writing process. In the following section we discuss the various pre-existing instruments and those we developed to measure each of these constructs.

Breadth of TA Experience

In consultation with the staff at the Centre for Teaching Support & Innovation at the University of Toronto, we included measures which asked respondents to indicate all of the responsibilities associated with the course they were assisting at the time of completing the survey. Responsibilities included grading, conducting problem set tutorials, delivering lectures, lab teaching, conducting discussion-based tutorials, holding office hours, responding to student email and any other responsibilities not included on the provided list. We created a measure that captured the breadth of teaching responsibility by summing the number of responsibility areas indicated by a TA. Those who marked one or two responsibilities were deemed to have a low responsibility within the teaching team; those who selected three areas were deemed to have a moderate responsibility level; those who selected four areas were deemed to have a high amount of responsibility; and those who selected five or more areas were deemed to have a very high breadth of teaching responsibility.

Approaches to Teaching Inventory

We created two scales using Trigwell & Prosser's (2004) Approaches to Teaching Inventory-Revised (ATI-R) version. Developed from interviews with 24 science teachers, the ATI-R measures the most extreme approaches to teaching that the authors identified from the narrative transcript data: 1) "the teacher-focused strategy with the intention of transmitting information to students" (p. 413); and 2) "the student-focused strategy aimed at students changing their conceptions" (p. 413). Thus, the ATI-R is comprised of two scales: the Information Transfer/Teacher-focused scale (ITTF) and the Conceptual Change/Student-focused scale (CCSF). The theory on which the instrument is based holds that an information transfer/teacher-focused approach to teaching is associated with students' adopting a surface learning perspective, while a conceptual change/student-focused approach to teaching is associated with students employing a deep learning approach. Construct validity, based on this theoretical proposition, was established by Trigwell, Prosser and Waterhouse (1999). Using principal factor analysis with varimax rotation, we found a similar factor structure as was reported by Prosser and Trigwell (2006), with the internal consistency of the ITTF scale ranging from 0.77 (initial) to 0.81 (follow-up) and the internal consistency of the CCSF scale ranging from 0.81 (initial) to 0.86 (follow-up).

Approaches and Study Skills Inventory for Students (ASSIST)

To assess student learning strategies, this study used Entwistle, McCune and Tait's (2000) Approaches to Study Skills Inventory for Students (ASSIST). This 52-item inventory is designed to assess students' learning approaches by measuring their score on three scales — deep learning, surface learning and strategic learning. This instrument has been used in numerous studies and has been shown to be valid and reliable across a variety of different contexts (Entwistle, McCune & Tait, 2000; 2006). The extent to which students score highly on the deep learning and strategic learning scales indicates their use of learning strategies associated with understanding content, relating ideas and using evidence. A confirmatory factor analysis using the principle component factor technique and orthogonal varimax rotation was conducted. The factor structure was consistent with the scoring guide (Entwistle, McCune & Tait, 2006) with the 13 sub-scales loading onto three factors: deep (alpha = 0.84), strategic (alpha = 0.81) and surface learning (alpha = 0.72). Entwistle, McCune and Tait (2000) provide a detailed discussion of the factor structure and construct validity.

Perceptions of Writing

Writing is a complex, non-linear exercise, and the study of writing therefore requires an integrative approach (Nightingale, 1988). In an effort to measure the complexity of the writing process, this study measured writing anxiety, self-efficacy and the perception of using metacognitive strategies for writing. While there are a variety of instruments that measure each of these constructs individually, there is no single instrument that includes all three. As such, the student survey and the survey completed by the WIT TAs included items from existing instruments as well as new items created and piloted for the current study.

To assess writing anxiety, two items were adopted from Martinez, Kock and Cass (2011) and modified to fit the new writing instrument developed for this study. The items ask students to rate their agreement with the statements, "Completing written assignments for a class makes me feel nervous" and "I feel confident in my ability to write essay responses as part of an exam." Martinez, Kock and Cass (2011) originally phrased this second item in the negative ("I feel rushed when completing a test with short essay questions"). In the context of this study, it was more analytically interesting to rephrase this item as an expression of confidence, as this feeling is often the converse of anxiety. Martinez, Kock and Cass (2011) reported an alpha of 0.80 for the anxiety items, suggesting good internal reliability. For the purposes of our analysis, both items were coded to ensure that lower anxiety was given the highest value. Thus, readers can interpret that more positive values indicate higher levels of self-confidence and lower levels of anxiety. In the student sample, the two anxiety

items were shown to load onto a single factor and were combined to form an anxiety composite with an alpha of 0.56. In the TA sample the items had weak internal consistency ($\alpha = .36$); this is thought to be a result of both small sample size and the small number of items. We intended to analyze these items separately for the TAs; however, because of the ordinal nature of the items and the small cell sizes, we were not able to conduct the chi-square analyses we had planned.

Items to measure writing self-efficacy were similarly adapted from Jones' (2008) Writing Behaviours Scale, which in turn was adapted from Ferrari and Parker's (1992) earlier general self-efficacy instrument cited in Jones (2008). There are ten items in the scale, which measure student self-beliefs about their ability to accomplish writing tasks and respond to challenges encountered while writing. In his 2008 study, Jones reported a Cronbach's alpha for this scale of 0.85. Factor analysis, again using principle component factors and varimax rotation, from the student sample indicated the self-efficacy items formed a single scale with an alpha of 0.76, while in the TA sample the internal consistency of the self-efficacy items was 0.70.

In developing items to measure writing metacognition, we examined several existing inventories. One of the best established of these is Lavelle's Inventory of Processes in College Composition (IPIC), an instrument which seeks to measure metacognition and self-efficacy in university writing (Lavelle, Smith & O'Ryan, 2002; Lavelle & Guarino, 2003; Lavelle & Bushrow, 2007). However, at 74 items, the research team felt that the IPIC was too long to be included in a composite instrument. To address this problem, 18 new items were created that drew upon the major themes in the IPIC and also reflected King's (2004) typology of experienced and less-experienced writers. Our research team selected a panel of four University of Toronto writing experts, based on their extensive work in the area of university students' writing and scholarship. These experts provided feedback on writing items and reviewed the new items for accuracy and clarity. Suggestions and recommendations made by the panel resulted in a revised set of items.

An attempt was also made to develop metacognition items based on Jacob and Paris' (1987) Index of Reading Awareness (IRA). This tool was designed to assess metacognition by evaluating how students evaluate, plan and regulate their own reading, as well as the conditional knowledge they apply when performing reading tasks. Using a similar framework and question structure, the research team created new items to assess these elements as they relate to writing. In total, 13 new items were created based upon the IRA.

The new writing metacognition instrument contained 31 items. They were piloted with 135 students enrolled in a summer writing course. The research team also sought feedback from those students, as well as writing experts working in the general and writing TA training programs at the University of Toronto. Based on the results of this process, the 13 items derived from the IRA were found to be unsatisfactory and were dropped from the instrument. Although the 18 items had good internal reliability ($\alpha = 0.80$), the rotated principle component factor analysis revealed that only six of the items loaded onto a two-factor solution. The two factors can be described as "goals and idea organization" (four items) and "considering audience" (two items). These six items were retained as a condensed metacognition composite and had good internal reliability ($\alpha = 0.77$ in the student sample; ranging from 0.62 to 0.79 in the TA sample).

To assess whether or not a student received certain types of instruction and feedback on writing assignments from his or her TA, seven yes/no questions were added to the follow-up administration of the instrument. These questions examined whether or not the TA assisted the student in understanding the goals and expectations of the assignment, provided written or oral commentary on the students work, and was available for consultation with the student. As with the other scales, a principle component factor analysis was performed on the seven feedback items. Six of the items were found to load onto a single factor, while the seventh did not load on any factor. The seventh item was excluded from the analysis and the six-item composite had an internal consistency of 0.80.

Quantitative Data Analysis

The quantitative data were analyzed according to research question clusters. In examining the first cluster focused on teaching responsibility and approaches to teaching, we asked the question: *To what extent, if any, is there a relationship between the breadth of TA teaching responsibilities and their approaches to teaching?*

In assessing this relationship, we used the composite measure of breadth of teaching responsibilities, which varied from low to very high, and TAs' approaches to teaching (the ITTF and CCSF scales). First, we used analysis of variance (ANOVA) to see if there was a difference in approaches to teaching at the initial and follow-up data collection by levels of breadth of teaching responsibility. For those who had data at both collection points, we also conducted an OLS regression in which we regressed the ITTF follow-up score on the breadth of teaching responsibility measure, controlling for participants' ITTF initial score. This is a similar analytic procedure to ANCOVA. We ran a parallel regression analysis for the CCSF measure. Again, for those who had data at both the initial and follow-up, we computed a change score in approaches to teaching by subtracting the initial score from the follow-up score. We transformed these continuous measures into dichotomous measures: a lesser use of ITTF strategies at follow-up than initial; and a greater use of CCSF strategies at follow-up than initial.

With the dichotomous changes in approaches to teaching variables, we performed a series of Chi-square tests of independence. This allowed us to examine the null hypothesis that breadth of teaching responsibilities and changes in approaches to teaching were statistically independent of one another. We conducted the latter analysis because we found thinking about TAs' changes in approaches to teaching over time in terms of doing something more (like the use of conceptual change strategies) and less (like the use of information transfer strategies) to be useful for those involved in program and policy development.¹⁵

The second question within the teaching responsibility and approaches to teaching cluster queried: *Do TAs who have taken on Peer Trainer roles differ from other TAs in their approaches to teaching?* To investigate if a difference existed between Peer Trainers and TAs in their approaches to teaching, a series of t-tests was used. Specifically, we examined if peer trainers and TAs differed in their approaches to teaching (ITTF and CCSF scales) at the initial and follow-up data collections. For those with data at both collection points, we then used OLS regression to examine the extent to which any difference between Peer Trainers and TAs in their approaches to teaching at the follow-up remained once we controlled for their approach during the initial data collection.

Moving into the research cluster that examined teaching professional development with regard to writing, we asked the question: *To what extent, if any, is there a relationship between breadth of teaching responsibility, experience as a TA and perceptions of writing for TAs in WIT courses?*

To investigate this question, we conducted a series of ANOVAs. We compared the four levels within the teaching responsibility, the two levels of experience as a TA (five terms or fewer; more than five terms) with perceptions of metacognition toward writing, writing self-efficacy and anxiety.

Due to small sample sizes, our statistical analyses of the TA data were largely limited to bivariate statistics or modest regression modeling. Moreover, we chose to use $p < .10$ as our level of significance given that group differences need to be substantially greater in small sample sizes in order to be statistically significant. Given the exploratory nature of this research study undertaken at a single institution examining two models of TA training, we find the more liberal level of significance to be warranted.

¹⁵ There are other analytic approaches one could use for this question. It would be equally appropriate to maintain the continuous nature of the change in teaching approaches measures. However, we find it less intuitive to think about a one unit change in the use of an information transfer/teacher-focused approach.

Within the student learning stream cluster we queried: *To what extent, if any, is there a relationship between TAs' approaches to teaching and students' approaches to learning?*

We used only student and TA data from the AOTP case study courses to investigate this question. As noted previously, we created a measure of TAs' change in reported teaching strategies. First, we computed a change in approaches to teaching from the ITTF and CCSF composite scores, subtracting the initial score from the follow-up score. We transformed these continuous measures into dichotomous measures: a lesser use of information transfer/teacher-focused (ITTF) strategies at follow-up than initial; and a greater use of conceptual change/student-focused (CCSF) strategies at follow-up than initial. We then assigned student respondents their TAs' values on these dichotomous measures: a lesser use of ITTF strategies at follow-up than initial; and a greater use of CCSF strategies at follow-up than initial.¹⁶ We conducted t-tests to examine if a difference existed in students' approaches to learning (surface, strategic or deep) by their TAs' change in approach to teaching. For example, this form of analysis examined if students whose TA reported a lesser use of ITTF strategies at the follow-up, reported a different use of surface learning strategies than students whose TA reported a greater use of ITTF strategies at the follow-up data collection. We conducted a series of t-tests to examine if differences in students' surface, strategic and deep learning strategies were associated with their TAs' lesser use of ITTF strategies and/or greater use of CCSF strategies. If differences were found in the bivariate analysis, we intended to estimate the relative magnitude of the two teaching approaches in relation to students' approaches to learning. In this regard, OLS regression would be used to predict each of the student learning strategies with both of the dichotomized measures indicating the changes in the TAs' approaches to teaching. Given the extremely small student sample (n=101), the degrees of freedom limited the extent to which we could control for other potential confounding variables, including students' initial approaches to learning.

We continued with several questions in Cluster Two of student learning. First, we examined, *what relationship, if any, existed between students' perceptions of TA feedback and students' approaches to learning*. We developed several stepwise regression models. For each outcome variable – follow-up scores on the surface, strategic and deep learning – a “null” model, containing only the control variables (initial score on the outcome variable, age; gender; and year of study), was first evaluated. We then added a dichotomous variable distinguishing the student as enrolled in either a WIT or AOTP course, and the students' perceptions of TA feedback composite. The “complete” model therefore included all of the control variables, plus the WIT/AOTP and feedback composite variables. Each analysis was performed on students who had complete data on all variables within the model (n=372).

The second research question within this cluster asked *whether TA feedback had an effect on student writing anxiety, self-efficacy or metacognition*. Again, we followed a similar procedure outlined in the previous research question. For each outcome variable – follow-up scores on anxiety, self-efficacy and perceptions of metacognition – a “null” model, containing only the control variables (initial score on the outcome variable, age, gender and year of study), was first evaluated. We then added a dichotomous variable distinguishing the student as enrolled in either a WIT or AOTP course, and students' perceptions of TA feedback composite. The “complete” model therefore included all the control variables, plus the WIT/AOTP and feedback composite variables. Each analysis was performed on students who had complete data on all variables in the model (n=364).

The case study courses for this study varied considerably in size, from 30 to 1150 students. We felt it important to have student respondents from across the case study courses and thus used a disproportionate sampling

¹⁶ Again, we acknowledge that one could maintain the continuous scale of the TAs' changes in approaches to teaching for this analysis. However, we find it more intuitive to think about the extent to which a student's approach to learning is associated with whether his/her TA uses more of a conceptual change (or less of an information transfer) approach to teaching over the course of the term.

procedure. Due to the sampling procedure, students had varying probabilities of being drawn into the sample. To correct for the disproportionate sampling allocation across the sample of case courses, we calculated sample weights for each participating course and incorporated these weights into each step of the regression model.

Qualitative Data Collection

Semi-structured interviews were conducted in a variety of forms (in person, via telephone or by Skype) depending on the interviewee's preference. All interviews were audiotaped and interview summaries were completed for all participants. Notable comments were transcribed verbatim. The interview guide addressed research objectives and was pilot tested on one of the research team interviewers. Interviews varied in length: student interviews ranged from 20 to 55 minutes, while Course Instructor and TA interviews were generally 30 to 60 minutes in duration. Interviews occurred between September 2011 and August 2012.

Qualitative Data Analysis

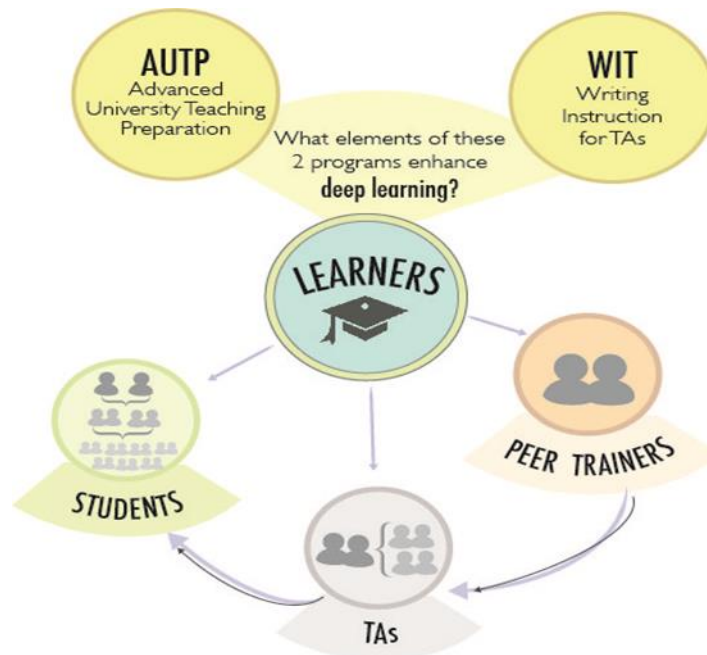
Qualitative data analysis focused on 153 interviews conducted for this study. All interview data were analyzed using a thematic analytic approach and the research team utilized a constant comparative method (Glaser & Strauss, 1967). Data analysis began during the data collection phase to ensure that the research team could begin to make meaning out of the collection of insights from a wide range of participant groups (Merriam, 1998). Throughout the analysis process several interview transcripts were read by three researchers on the team to ensure that key ideas, relevant comments and emergent issues were discussed. Two of the researchers performed a more detailed ongoing analysis based on full research team discussions and worked to categorize meaningful units of data into clusters. Themes emerged based on thorough reviews of the transcripts, guided by the study's research questions and the relevant literature.

As common themes emerged from the raw data, one central list of codes was developed in NVivo 10 and became the basis of a more rigorous inductive analysis. Where possible, participants' voices were preserved to ensure accuracy of reporting and to lend ownership to their perspectives related to the two program models under examination. All participants were provided with a code to preserve anonymity in the reporting process.

Results and Discussion

Study results and discussion focus on the key learners associated with both the AUDP and WIT models, as illustrated in Figure 3.

Figure 3: Model of Learners in Two University of Toronto TA Programs



Characteristics of the TA Experience

Pursuant to the stated research questions, this study was interested in the range of responsibilities that TAs have as part of the teaching team. We asked TAs (n=168) in our study to indicate all of the responsibilities that they had as a part of their TA appointment. Table 2 focuses on the percentage of TAs in the sample who carried out each of the responsibilities listed.

Table 2: Range of TA Teaching Team Responsibilities, n=168

TA responsibilities	Percentage
Grade	71%
Respond to student email	49%
Hold office hours	39%
Hold discussion-based tutorials	33%
Teach labs	30%
Conduct lectures	18%
Hold problem set-based tutorials	15%
Identified other responsibilities not listed	13%

As noted earlier, we created a “breadth of teaching responsibility” composite measure by summing the number of responsibility areas indicated by a TA. Those who selected one or two responsibilities were deemed to have a low responsibility within the teaching team (this included 43% of our respondent pool); those who selected three areas were deemed to have a moderate responsibility level (17%); those who selected four areas were deemed to have a high amount of responsibility (26%); and those who selected five or more areas were deemed to have a very high breadth of teaching responsibility (15%).

Since one of the purposes of this study was to examine the nature of the TA experience within the teaching team, it was deemed important to understand how frequently TAs met with the Course Instructor. Of those who responded (n=126), 27% reported meeting weekly with the Course Instructor and 24% reported meeting every two to three weeks. Only 13% of our sample reported having never met with the Course Instructor.

We were also interested in what was discussed during the teaching team meetings. Results have been aggregated to reflect the percentage of TAs (n=79) who reported that at least half of the TA meetings with the Course Instructor focused on the topics listed in Table 3.

Table 3: Topics Discussed between TAs and Course Instructors (CIs) in TA Meetings, n=79

Topics Discussed between TAs and CIs	Percentage
Requirements of the TA appointment	76%
Course administration (e.g., rules, regulations, policies)	61%
Teaching strategies	57%
TA’s experiences in labs, tutorials & student meetings	56%
Overall views on the course	54%
Student questions and concerns	52%
Course tutorials/labs	47%
Grading and evaluation	43%
Students’ learning performance	39%

In the TA open-ended survey comments,¹⁷ respondents listed a few different ways in which they met with both Course Instructors and their TA peers. One TA shared some specific collaborative activities that occurred with the course instructor:

We discuss the lecture material and the professor's approach; the progress of our tutorials and any especially interesting student questions that might inform the professor's future curriculum development; the place of our course and its assignments in the overall undergraduate curriculum; and, occasionally, the relationship of our TA work with our research and other aspects of the graduate program. (AUTP TA)

Not only did TAs meet with the Course Instructor, they also met regularly with other TAs from the course. Excluding the respondents who were the only TA for the course, 41% reported meeting at least weekly with their peers. This level of involvement and responsibility within the teaching team may have contributed to the 84% of TAs who reported that their TA experience during the period of this study was “good” or “excellent.”

AUTP qualitative open-ended survey responses also indicated strong involvement with other course TAs. Many of these TAs reported that they discussed marking schemes/guidelines and any grading concerns or challenges. A few TAs shared teaching strategies and ideas with one another, while another small group of respondents discussed the course content and how their tutorials fit within the course. They also focused their discussion on general student participation within their tutorials. As one TA noted, “*Us TAs, we share our experiences in the course and learn from each other that way*” (AUTP TA).

TA Learning Stream: TAs’ Breadth of Responsibility and Approaches to Teaching

One of the key purposes of this study was to examine the extent to which TAs’ breadth of teaching responsibility was related to the approaches used in their teaching. In this section, we include both quantitative and qualitative (open-ended TA survey responses) data to support our findings.

Relationship between TAs’ Breadth of Teaching Responsibility and Their Approaches to Teaching

Using the breadth of teaching responsibility measure and the Information Transfer/Teacher Focused (ITTF) score as well as the Conceptual Change/Student-Focused (CCSF) score from the Approaches to Teaching Inventory-Revised (Trigwell & Prosser, 2004), we investigated whether TAs’ approaches to teaching differed by their breadth of teaching responsibility. For this examination, we conducted a series of one-way ANOVAs as the number of respondents varied from initial to follow-up for our dependent measures. We found no difference in the use of an ITTF approach at either the initial data collection ($F(3,130) = 0.04$; $p > .01$; $n=134$) or follow-up data collection ($F(3,64) = 0.68$; $p > .01$; $n=68$) by breadth of teaching responsibilities. Similarly, we found no difference in the use of a CCSF approach at either the initial data collection ($F(3, 129) = 0.34$; $p > .01$; $n=133$) or follow-up data collection ($F(3,64) = 0.21$; $p > .01$; $n=68$) by breadth of teaching responsibilities.

We also regressed the two outcomes measures (ITTF and CCSF follow-up scores) on the breadth of teaching responsibilities measure, controlling for respondents’ initial scores on these measures. We found breadth of teaching responsibilities negatively associated with ITTF follow-up score ($B = -0.13$; $p < .10$), controlling for ITTF initial score ($F(2,45) = 13.73$; $p < .001$; $n=48$). Taking into account respondents’ use of ITTF strategies at the initial data collection, this result suggests that an increase in TAs’ breadth of teaching responsibilities is

¹⁷ Throughout the rest of our report, comments drawn from open-ended survey responses do not include the TA’s discipline, as this information could not be linked to a specific TA. We provide the program name (AUTP or WIT) only. Interview quotations provide both the TA’s program and discipline.

associated with a decrease in the use of information transfer/teacher-focused strategies. We found no statistically significant difference between breadth of teaching responsibilities and TAs' use of conceptual change/student-focused teaching strategies, ($B = 0.01$; $p > .10$) once we controlled for TAs' initial use of these strategies ($F(2,45) = 54.18$; $p < .001$; $n=48$). See Table 4.

Table 4: Relationship between Breadth of Teaching Responsibilities and Approaches to Teaching, n=48

Variable	ITTF		CCSF	
	B	SE B	B	SE B
Initial score	0.68***	0.13	0.88***	0.08
Breadth of Teaching Responsibilities	-0.13†	0.69	0.12	0.05

Note. $R^2 = 0.38$ for ITTF and 0.71 for CCSF.

† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

The previous analysis examined the follow-up scores as continuous measures; for example, a one unit increase in the breadth of teaching responsibilities (for example from low to moderate) was associated with a 0.13 reduction in TAs' use of ITTF strategies, controlling for initial ITTF strategy use. Although this relationship is interesting, these results may be less than intuitive for those involved in program and policy development. For this reason, we also examined the extent to which increases in the breadth of teaching responsibility was associated with the change TAs reported in using ITTF and CCSF teaching strategies from the initial to follow-up data collections. This analysis used the previously described breadth of teaching responsibilities measure as well as two measures from the ATI: decreased use of ITTF strategies at follow-up data collection and greater use of CCSF strategies at follow-up data collection.

We found a relationship between breadth of teaching responsibilities and decreased use of ITTF strategies at the follow-up. Across our four categories of breadth of teaching responsibilities (from low to very high), on average, TAs with a broader range of teaching responsibilities reported using fewer ITTF strategies in their teaching ($\chi^2(3,1) = 9.09$; $p < .05$). We also found a relationship that approached our identified threshold of statistical significance between breadth of teaching responsibilities and use of conceptual change/student-focused strategies. Again, TAs with a broader range of teaching responsibilities reported a greater use of CCSF strategies at follow-up ($\chi^2(3,1) = 6.02$; $p = 0.11$: See Tables 5 and 6).

Table 5: Breadth of Teaching Responsibilities and Changes in ITTF Strategy Use, n=48

	Same or greater use of ITTF strategies	Less use of ITTF strategies	Total
Low	14 (9.7)	2 (6.3)	16
Moderate	6 (6.6)	5 (4.4)	11
High	3 (6.0)	7 (4.0)	10
Very high	6 (6.6)	5 (4.4)	11
Total	29	19	48

Note. Expected values under the null hypothesis are presented in parentheses. $\chi^2(3,1) = 9.09$; $p < .05$.

Table 6: Breadth of Teaching Responsibilities and Changes in CCSF Strategy Use, n=48

	Same or less use of CCSF strategies	Greater use of CCSF strategies	Total
Low	4 (4.7)	12 (11.3)	16
Moderate	2 (3.2)	9 (7.8)	11
High	6 (2.9)	4 (7.1)	10
Very high	2 (3.2)	9 (7.8)	11
Total	14	34	48

Note. Expected values under the null hypothesis are presented in parentheses. $\chi^2(3,1) = 6.02$; $p = 0.11$.

It appears that TAs who have a broader set of teaching responsibilities develop over time a teaching approach that reduces its focus on information transfer (without eliminating it, as this is appropriate for certain times) and increases its focus on asking students to think about course content in conceptual terms.

Course Involvement

As noted in the survey data, TAs are engaged in a range of TA responsibilities and we examined open-ended survey responses to explore course involvement descriptions more fully. Several TAs provided extensive descriptions. AUTP TA open-ended responses, for example, showed that several TAs had involvement in course material development and some input in the development of at least one evaluation piece:

A few months before the professor circulates the assignment outline to the class, he asks us to contribute approximately three questions each on the novels that each assignment will address. From those we recommend, he chooses about one question/TA (for a total of about 10-12 options on the assignment sheet). At our weekly meetings, we do discuss what kinds of questions seem to have produced the strongest responses in the past, so we're learning from the experience as we go –and we're also invited to point out which texts don't seem to engage the students as much as others. (That is – we weren't invited to select the readings for this iteration of the course, but our input can help to shape the prof's development of the same course for next year). (AUTP TA)

A few TAs reported that they had developed all the evaluation/assessment approaches and two TAs stated that their involvement entailed providing feedback on the course syllabus to the Course Instructor – this input would be used to inform future iterations of the course. Many TAs had the sole responsibility to deliver tutorials or labs. A few TAs reported that they were solely responsible for the design and the delivery of a guest lecture.

Significant Teaching Experience

When both AOTP and WIT TAs were asked to share one significant thing that they had learned about teaching in their most recent TA experience, written open-ended responses addressed a number of areas that are more fully developed throughout this report. More specifically, these survey comments elucidate their approaches to teaching and ongoing efforts to improve their teaching. Of note, two-thirds of WIT TAs reported on teaching techniques and strategies that demonstrated an effort to achieve a more student-focused approach to teaching. Likewise, AOTP TAs added important responses that also reflected a student focus:

- a) Differentiation: *“balanced weak and strong students thru [sic] structured tutorials”* (WIT TA) and *“Using different teaching techniques in class to reach students with different learning styles (PowerPoint, images, handouts, having them draw/write on the blackboard or on a handout, personal instruction with the object/bone in front of them)”* (AOTP TA).
- b) Assigned practical exercises: *“real life examples”*; *“be authentic”* (WIT TAs).
- c) Lessons focused on formative feedback: *“verbal feedback must be clear”* and *“how to look for effective scientific writing”* (WIT TAs).

Open-ended survey responses also identified time management issues and associated learning across both AOTP and WIT programs. TAs mentioned the need for preparation for tutorials and labs: *“be prepared and plan”* and *“be productive with your time.”* Almost half of AOTP TAs and a few WIT TAs commented that they needed more professional development and TA training, deemed by one WIT TA as *“vital to providing the best possible teaching experience.”* Another response included: *“I feel that learning through experience is really the best way to do it, followed by workshops and seminars that help correct your teaching technique along the way”* (AOTP TA). As well, helpful suggestions included: *“[It is] valuable to learn marking guidelines and university policies”* (WIT TA).

Another AOTP TA remarked, *“I think departments need to take a more organized approach to TA training. Departments need to take a stance on pedagogy and the duties of a TA. They need to communicate this to the professors, the TAs, and the students.”*

AOTP TAs tended to report primarily on what they learned from specific training experiences (e.g., from the AOTP certificate program) that addressed teaching and presentation strategies: *“[talking about microteaching] helped me understand a variety of teaching methods and incorporate new styles into my teaching.”* Further:

Specific tips or skills I have learned are as follows: the importance of a clear lesson plan with goals and objectives; the importance of a positive and engaging teaching persona in order to foster a positive and active learning environment; the use of a number of different examples to ensure that all students are learning; asking students questions to engage them with the material that they have read and to get them thinking; find something in the material that I enjoy in order to promote my own enthusiasm... be open and approachable. (AOTP TA)

Comparison of Peer Trainers and TAs in Approaches to Teaching

As noted earlier in the report, there are multiple learners within this study: students, TAs and Peer Trainers. One of our questions under the TA Learning Stream compares the approaches to teaching used by Peer Trainers and TAs.

Our analysis used the two composite scores from the ATI-R (Trigwell & Prosser, 2004): the ITTF score and the CCSF score. No difference was found between Peer Trainers and TAs in their use of ITTF strategies at the initial data collection. However, at the follow-up, Peer Trainers reported using fewer ITTF strategies than TAs ($t(92) = 2.40$; $p < .05$). In terms of using CCSF strategies, Peer Trainers reported using more of these strategies

both at the initial ($t(159) = 3.43; p < .001$) and follow-up data collection points than TAs ($t(92) = 2.93; p < .01$). See Table 7 for more detailed data findings.

Table 7: TA and Peer Trainer Approaches to Teaching

	Mean	Std Dev
TAs		
ITTF* Initial (n=134)	3.43	0.68
ITTF Follow-up (n=68)	3.52	0.65
CCSF** Initial (n=133)	3.82	0.65
CCSF Follow-up (n=68)	3.82	0.75
Peer Trainers		
ITTF Initial (n=28)	3.28	0.59
ITTF Follow-up (n=26)	3.16	0.60
CCSF Initial (n=28)	4.28	0.59
CCSF Follow-up (n=26)	4.29	0.55

Of the TAs with matched initial and follow-up data on the ATI-R (n=48), 40% reported using fewer ITTF strategies at the follow-up, while 71% reported using more CCSF strategies. Of the Peer Trainers with matched initial and follow-up data on the ATI-R (n=25), 52% reported using fewer ITTF strategies at the follow-up while 48% reported using more CCSF strategies.¹⁸

We were interested in whether the differences between TAs and Peer Trainers' approaches to teaching at the follow-up would persist when accounting for respondents' approaches at the initial data collection. We conducted two OLS regressions, separately predicting the ITTF follow-up score and CCSF follow-up score with the peer trainer/TA dichotomous variable (Peer Trainer = 1; TA = 0), controlling for the commensurate initial score. This is essentially equivalent to an ANCOVA design. We found that Peer Trainers used less of an information transfer/teacher-focused strategy at the follow-up than other TAs ($B = -0.28; p < .05$, controlling for their initial approach using this strategy ($F(2,70) = 19.45; p < .001; n=73$)). We found that the difference in using a conceptual change/student-focused approach did not differ between Peer Trainers and other TAs at the follow-up data collection stage ($B = -0.02; p > .10$), when the initial score was taken into account ($F(2,70) = 61.08; p < .001; n=73$). It is important to note that the Peer Trainers reported a higher score in their use of CCSF strategies at the initial data collection. Thus, less change in their use over time is to be expected. See Table 8.

¹⁸ The two approaches to teaching correlated -0.07 ($p > .10$) at the initial data collection (n=161) and -0.09 ($p > .10$) at the follow-up data collection (n=94).

Table 8: Difference between TA Role and Approaches to Teaching, n=73

Variable	ITTF		CCSF	
	B	SE B	B	SE B
Initial score	0.58***	0.10	0.80***	0.08
Peer Trainer	-0.28*	0.13	-0.02	0.12

Note. $R^2 = 0.36$ for ITTF and 0.64 for CCSF.

* $p < .05$. ** $p < .01$. *** $p < .001$.

These findings show that Peer Trainers, over the period studied, relied less on information transfer approaches to teaching and used conceptual change approaches more frequently than did course TAs. This is not surprising, given the fact that Peer Trainers have been selected to serve as role models and trainers likely because of their comfort with using pedagogies that acknowledge (and perhaps even prioritize) students in the co-construction of knowledge. In addition, in comparison to TAs, several Peer Trainers included in this analysis have received extensive experience teaching in multiple disciplines at both the undergraduate and graduate levels, and their ATI-R responses may be better understood from this experience standpoint. In addition, in some cases Peer Trainers in both study models have had experience teaching graduate-level students, which may involve, for example, different expectations for teaching.

TA Learning Stream: TA Professional Development: Writing

Metacognitive strategies

Another purpose of this study was to examine the professional development of TAs, in terms of developing TAs as future faculty as well as for other non-academic career avenues. This study examined metacognitive strategies toward writing as well as writing self-efficacy and anxiety as one area of professional development for TAs participating in the WIT initiative. According to J. H. Flavell, who first used the word metacognition, it refers to “one’s knowledge concerning one’s own cognitive processes or anything related to them” (Flavell, 1976, p. 232). Our analyses within this theme sought to investigate if a difference existed in the metacognition of TAs toward writing or in their sense of writing self-efficacy and anxiety according to the breadth of their teaching responsibilities. We also examined to what extent metacognition toward writing, writing self-efficacy and anxiety was related to the number of terms of TA experience.

In this analysis, we conducted a series of one-way ANOVAs to see if there was a difference in WIT TAs use of metacognition toward writing and writing self-efficacy. We found no difference in the use of metacognition toward writing or writing self-efficacy by breadth of teaching responsibilities. TAs with a broader span of teaching responsibility did not statistically differ from their peers with a narrower span of responsibility in their use of metacognitive writing strategies or in their self-efficacy toward writing at the initial or follow-up data collection points. Using OLS regression to examine WIT TAs who had data at both collection points, there was no difference in their follow-up use of metacognitive writing strategies or in their self-efficacy toward writing by breadth of teaching responsibility, controlling for initial scores on the outcome measures.

Although the sample size differed between initial ($n=54$) and follow-up ($n=35$) data collection points, we found interesting differences by total number of terms of TA experience on the metacognitive composite score. At the initial data collection, TAs with more experience (more than five terms) reported lower levels of metacognition toward writing (mean = 3.66) than their peers with less TA experience (mean = 4.10) ($t(52) = 2.37$; $p < .05$).

However, by the time of the follow-up this difference in metacognition by amount of TA experience was no longer statistically significant. We found no statistically significant differences in TAs' writing self-efficacy in either the initial or follow-up data by TA experience. TAs with more than five terms' experience did not differ from their peers with less experience in terms of writing self-efficacy. For WIT TAs with data at both collection points (n=32), we used OLS regression to examine if there was a difference in TAs metacognition toward writing and writing self-efficacy by TA experience, controlling for initial scores on these two outcome measures. We found no statistically significant differences. For more detailed results, see Table 9.

Table 9: TA Writing Metacognition and Self Efficacy, by TA Experience

	Mean	Std Dev
Metacognition Initial (n = 54)	3.98	0.64
5 terms or less (n = 39)	4.10	0.63
More than 5 terms (n = 15)	3.66	0.56
Metacognition Follow-up (n=35)	3.79	0.80
5 terms or less (n = 25)	3.84	0.81
More than 5 terms (n=10)	3.73	0.80
Self-efficacy Initial	3.91	0.57
5 terms or fewer	3.97	0.57
More than 5 terms	3.73	0.57
Self-efficacy Follow-up	3.81	0.61
5 terms or fewer	3.85	0.64
More than 5 terms	3.80	0.56

These findings may raise more questions than answers. One of the limitations of our data collection was that we knew little about what kind of teaching responsibilities TAs had in previous terms. If the TA had four terms' experience as a marking TA, then this would yield a qualitatively different TA experience than would four terms as a WIT TA in terms of the emphasis on developing writing skills. However, given the fact that we found no differences in either the breadth of teaching responsibility measure or the amount of TA experience in TAs' metacognition toward writing or their writing self-efficacy, this may indicate a need to dedicate more attention to this form of TA professional development.

Student Learning Stream: Graduate Student Pedagogical Learning and Undergraduate Students' Approaches to Learning

In this section, we focus on the second major inquiry stream in this study: student learning. For this portion of the study, we consider "students" at both the undergraduate and graduate levels. We rely predominantly on qualitative interview data to explore graduate student pedagogical learning and undergraduate students' approaches to learning. In many cases, we drew upon undergraduate students' comments on how the TAs approached teaching, which provided insights into both how undergraduate students learn best and what specific approaches to teaching TAs employed.

We begin by highlighting three major themes that emerged in our qualitative findings from Peer Trainer, TA, Course Instructor, and Student interviews. These themes support a trajectory in graduate student development that includes an emphasis on the development of professional identity: (1) *Pedagogical practice* describes ways in which TA participants developed their own teaching philosophies and teaching repertoire as they interacted in various course and TA workshop environments; (2) *Teamwork and collaborative cultures* describe the social environment that was integral to both TA models; and (3) *Career orientations and transferable skills* highlight ways in which learners could identify and discuss the applicability and practicality of their teaching and learning experiences to future contexts.

Pedagogical Practice

Deep student learning is achieved through the use of teaching approaches that are generally more student-focused than teacher-focused. Both AOTP and WIT models strive to support TAs in their development of student-focused pedagogical approaches. TAs spoke about their emergent teaching philosophies and the training elements and activities that guided and informed their teaching repertoire. We illustrate this through two specific training examples widely used by WIT TAs: benchmarking and formative feedback. Finally we present samples of teaching techniques and strategies that both AOTP and WIT TAs employed in their courses.

Emergent teaching philosophy. This study draws attention to the process by which TAs and Peer Trainers became better teachers *and* learners, best exemplified by one Peer Trainer who had worked as a TA for six years: “*It was also a learning process, you know, when I was giving a training, I was learning at the same time... so that was one of my goals, was to learn more and more from this event while I’m working*” (AOTP Peer Trainer, physical sciences).

One humanities AOTP Peer Trainer felt that his or her own undergraduate education had not cultivated critical thinking skills, but this was remedied through the pedagogical training they received:

[B]eing exposed to certain pedagogy and seeing how obvious it is that we want our students to be shown these higher levels of analysis and synthesis...the pyramid image of student retention¹⁹ just blew my mind... but until that sort of paradigm is shown to you, it wasn’t maybe as obvious to me how much I was sticking around the top end of just pure knowledge acquisition and regurgitation.

This participant further discussed how important the AOTP training experience was in determining important student learning goals, or “*what’s sort of better for them as thinkers and as human beings*” (AOTP Peer Trainer).

Many TA interviews revealed emergent teaching philosophies and efforts to use student-centred approaches that would develop core competencies in their students. Prior to WIT training, one TA thought that the program was about teaching grammar but learned from those sessions that it was much more than that:

[It was] more about teaching research skills. I see the purposes that we are trying to teach students how to think in addition to teaching them the specific subject matter of our course. Right? How to, teach these students how to think and write critically, in addition to think and write about, you know, the history of [names subject matter]. (WIT TA, humanities)

Peer Trainers shared the process by which they sought to develop higher-order critical thinking skills in their students, and one noted: “*It’s really important for me as an educator to challenge their ways of thinking and help them develop new ways of thinking and broaden their perspective... how it relates with the big picture*” (AOTP Peer Trainer, physical sciences).

A second Peer Trainer provided a more detailed example of critical thinking: persuasive writing. This participant described enjoyment in teaching how these methods work, but also how to recognize misuses of this writing technique. The Peer Trainer wanted to equip students with skills to detect these methods, to help

¹⁹ The respondent is referring to a student retention chart in David Sousa (2006), *How the Brain Learns*, 3rd ed. California: Corwin Press, adapted from National Training Laboratories of Bethel and NTL Institute of Alexandria, VA. This chart was used in one of the AOTP certificate training sessions.

students become more resistant to manipulative persuasion, and to more thoroughly analyze what is being said:

It sounds like quite a bit of a crusade but really it's just a matter of giving people practical skills to understand just a little bit of logic and to become resistant to manipulation and faulty persuasion. In order for me to do that, I have to get them to change the way they think. (AUTP Peer Trainer, humanities)

Several TAs expressed a desire to enhance deep student learning via co-learning, self-directed learning, and a focus on relevant learning examples. One TA explained that students tend “*to learn things in a kind of robotic manner without actually understanding... they can learn how to differentiate without understanding what a derivative is*” (WIT TA, physical sciences). In response to this surface learning example, the TA intentionally sought a deeper learning experience and chose tutorial problem sets, quizzes and midterm questions that seemed similar or slightly harder than the material on which students would be tested.

TAs further reflected on their ongoing roles and developing beliefs as teachers, and the role of knowledge construction in the classroom:

I don't see my role as imparting all the knowledge that is in my head onto them... I tell them to ask the person beside them, the other people at the bench, then the whole class, and finally me. Certainly I want them to know what I know in the context of the lab... but in general they don't necessarily need to know that I'm the expert in anything. (WIT TA, life sciences)

In addition to the co-construction of knowledge, a few TAs also commented that it is important to foster a more self-directed student learning environment: “*The role of teaching is to, in my mind, guide you on an experience, to give you some focus on what you are doing, but you should be very much self-engaged in your own learning experience*” (AUTP TA, humanities). Another participant echoed a similar theme:

My role is not to spoon-feed in the sense that I feel it is a disadvantage to the students where they become dependent. So I don't want to be the one who dictates how they learn, in the sense that ‘here is the material and this is what I want you to know and nothing else.’ I want my students to be able to come to the class, access the information, see it somewhere else, represent it... different than the way I would have done it, but it's correct. (AUTP Peer Trainer, physical sciences)

Finally, many TAs sought to ensure that course material was situated in the world outside the university, relevant, and in turn, more student-centred:

[N]ot necessarily about the course itself but it's also about their general university education and also the relevance of the world... I've developed, what I call Relevance of the Course, so it's every week I will bring in a newspaper article that is related to the course, or whatever. And we'll talk about them. (AUTP TA, physical sciences)

TA training. Both AUTP and WIT TAs discussed their training as a rich and varied set of activities, full of tremendous opportunities for learning in diverse areas from pedagogical expertise to collaborative, interpersonal, and communication skills. One social science AUTP Peer Trainer mentioned that TAs appreciate the range and number of teaching techniques shown to them without being directed towards a particular approach: “*I encourage them to choose the ones that work for them and that they think will work for their classes... I want to provide a lot of options so that they can decide for themselves.*”

While Peer Trainers in AOTP and WIT participated in formalized training for their positions, they also engaged in informal learning and mentoring with other Peer Trainers, some of whom had previously worked in a peer training role. This network of peers has created a community of teachers who strive to improve their knowledge and skill base as teachers. One Peer Trainer in the AOTP program described how more experienced Peer Trainers approached teaching, learning, and mentoring:

One of my goals when I began my work as a coordinator was to work with the social science trainers and help them to use better frameworks in their training, help them apply some key principles of pedagogy and 'good teaching,' within the context of TA training. One of the major critiques the trainers had of their own modules was that they were too 'lecturey.' They wanted more activities. I wanted them to understand the pedagogical goal behind the integration of an activity. Activities are not just for socializing, they are for learning. This means thinking about what is to be learned through the activity, how the activity advances the goals of learning and the engagement with content.

The Peer Trainer further described a way in which Peer Trainers might incorporate prior learning recognition concepts into their own TA training so that a TA begins where learners "are at":

You get them to articulate what they already know before you modify, critique, or expand that knowledge with new information. So, an introductory activity in TA training can be about articulating what new TAs already know about good classrooms, good TAs, good teaching practices.

As noted previously, the AOTP certificate program focuses on – among other pedagogical approaches – training TAs (across all disciplines) to use cooperative/collaborative and interactive strategies. Interview data illustrated that TAs who had worked as Peer Trainers could identify key learning experiences, often using pedagogical language, and attributed this learning to specific elements of their WIT or AOTP training. WIT TAs also shared their use of several teaching approaches that demonstrated a commitment to deep student learning via a range of strategies and practices. The following themes emerged from Peer Trainer and TA descriptions of the ongoing development and improvement of their pedagogical practice.

Benchmarking sessions. As reported previously, TAs identified in their survey responses that grading was a key (and in some cases, the sole) responsibility for AOTP and WIT TAs. In light of this finding, it is not surprising that during their interviews many of these TAs (primarily WIT) spoke often about benchmarking activities and the training they received in this area. Indeed, the WIT program itself aims to make marking meaningful for TAs and students, with extra TA hours allocated for training in benchmarking, for example. As described previously in this report, benchmarking is a process by which TAs assess a sample student paper by following grading criteria and established assignment guidelines. Benchmarking serves to create greater clarity regarding the standards for consistent assessment. This is particularly useful for writing assignments, which are more subjective than other forms of assessment. Course instructors, LWTAs and course TAs may participate in the benchmarking process.

According to some of the WIT participants, these benchmarking sessions were helpful for the TAs and were variously described as ensuring a "consistent", "standardized", "effective" and "substantial" grading practice, while one Course Instructor noted, "I feel more confident about the [TA] marking."

One TA described the WIT grading process as very useful: "just to make sure we were all on the same page and treating our students equally and actually [learning] how to give constructive feedback" (WIT TA, life sciences). Similarly, a second TA felt benchmarking was helpful in that the course team utilized previous problem set solutions from the course assignments and worked together to examine the strengths and challenges in the students' writing submissions:

When we actually got together to do the marking for the course itself, for the actual projects that we were assigned, we actually did that too. So [Course Instructor name]... gave us a bunch of assignments that the students had submitted for the course and as a group we went together through the criteria to look for, some of the bad features that stuck out and then after that we got our own, individual submissions to mark. (WIT TA, physical sciences)

Overall, TAs spoke highly of the discipline-specific skills that LWTAs brought to benchmarking activities and viewed these Peer Trainers as an integral part of the WIT team:

The meetings we had to discuss marks with our LWTA were the most useful. We met after every assignment due date – we'd have two marks meetings [for each assignment] to ensure we were on the right page with grading. For the first assignment we had more time (two meetings). I had a paper I wasn't really sure about and [LWTA] kind of looked it over and talked about what to do with it. (WIT TA, humanities)

One LWTA further described benchmarking as an important effort to understand the *meaning* of writing within each discipline, something that TAs may not have been formally taught in previous TA assignments. The WIT program offered both LWTA and TAs an opportunity to delve more closely into the writing process. In some cases, both the TAs and students may not have previously incorporated such writing activities:

Because it's not clear to a lot of people what are we grading in a math course in terms of writing. So pointing out to them [TAs] that it's not about grammar and tense as much but they [students] have to be able to logically write down, there has to be a sequence, a linear thought process going on without any gaps. They should be able to convince you, whether it's in English or in math, this is correct. (LWTA, physical sciences)

TA interviews also allowed time for participants to suggest improvements in the benchmarking process. In one case, a TA sought a more interactive benchmarking and grading session and revealed a desire to engage more deeply with this practice:

I was under the impression they were going to show you actually some techniques, as opposed to 'what did you do' and then let's see how it works... I wanted it to be more active, it was kind of passive saying 'oh you did that and that's good', sometimes it's not that helpful getting confirmation of what you are doing right, you want to hear what you are doing wrong, or other ways of going about it. (WIT TA, humanities)

Formative feedback. Formative feedback is defined as “information communicated to the learner that is intended to modify his or her thinking or behavior for the purpose of improving learning” (Shute, 2008, p. 154). Shute also notes that “feedback that has negative effects on learning is not formative” (p. 156). Black and Wiliam (1998a, 1998b), among many other researchers, report on the purposes and outcomes of formative feedback and highlight its role in enhancing student learning and guiding revisions, strategies and improvement.

Formative feedback is a key concept for both AOTP and WIT models. WIT TAs are provided training in formative feedback related to student writing, while in AOTP the TAs themselves are provided with formative feedback through mechanisms such as micro-teaching. Training in formative feedback is evident in both programs through exposure to techniques such as scaffolded learning and iterative assignments. For example, instruction in assignment design might include scaffolding that breaks down learning objectives into manageable steps to provide students the supports they require. Often, these staged assignments may include instructor modeling as well peer and instructor formative feedback.

According to several interview respondents, WIT TAs utilized extensive formative feedback and students incorporated TA feedback into their next assignment/report iteration. In such cases, it is reasonable to conclude that the TAs provided appropriate supports to student deep learning approaches. One Course Instructor offered the following:

There was this student that really struggled on their draft, the first version of the proposal, they didn't do very well, got a pretty poor mark... [on] the student's final she had got an amazing mark... I attribute it to the TA as she gave the written feedback [and] I'm sure it was amazing for that student to see such a dramatic improvement and for the TA to witness that as well. (WIT Course Instructor, life sciences)

A few undergraduate students commented on the usefulness of the TA's scaffolding and feedback, including the following:

[Feedback was] definitely [useful]. Well, it wasn't a general kind of comment on your report. It was specific things you needed to improve... on the assignments some of the step-by-step processes (like brainstorming) were just completion marks, but they had to hand in a rough draft and that was commented on and feedback was helpful. (WIT Student, life sciences)

TAs frequently reported a high degree of satisfaction with WIT assignment design, in large part because it allowed students to steadily improve their writing and build on previous iterations of their work. A humanities LWTA shared the process by which the course teaching team sought to change the assignment structure to *"allow for better learning throughout the process."* A three-phase assignment was designed to incorporate formative feedback at each stage. An undergraduate student in the course described the process in this way:

They made it pretty simple because they broke it down into three stages. The first stage we had to fill out an outline sheet – state your thesis, the sources you will use, how are you going to argue your thesis – those kinds of things. Stage two was just a rough draft and stage three was the final draft. The first two stages were not graded but just commented on... but feedback was useful. For stage one they offered feedback on the content – be more specific, focus more on this, and be clearer in the connections. But then for stage two they offered more feedback on editing and to be clearer in sentences. (WIT Student, humanities)

Of interest, a few TAs compared their experiences with non-WIT courses in which they were also involved. In one case, a life sciences TA noted that WIT assignments were better written in that they were:

...fair and I thought that they covered a broader spectrum of ideas and test questions, rather than some of the courses which they tend to focus on one main idea. They [the WIT course] have several questions basically asking the same idea... there was also a good range of difficulty within the questions including both easier and harder questions, which wasn't always the case in other courses. (WIT TA, life sciences)

A life sciences student touched upon a similar iterative assignment and discussed the types of pre-lab feedback that assisted with the writing of the main lab report and also set the stage for using these transferable skills and approaches in future learning: *"... the feedback given on the final lab report would be helpful in other lab courses because it is all about formal writing and how to write a report, so it would definitely help for future courses"* (WIT Student, life sciences).

In a select few WIT courses, the TAs also incorporated student peer feedback activities. Students were asked to bring assignments (whether completed or not) to their lab session to get feedback from one another:

So that was part of the way it was set up, to actually give them the opportunity to review what they think a good assignment should look like and be able to look at each other's and see are they actually on the right track or not, and get feedback from classmates. (WIT TA, life sciences)

This TA further explained that during the first year of WIT they learned how to incorporate more feedback early (in the first draft) and while it may be time-intensive, *“you get more back out of it in the final draft...and I think the students appreciated the feedback too. That was my aim”* (WIT TA, life sciences).

Application of techniques and strategies: Classroom writing activities. A life sciences LWTA applied for the WIT position because of an interest in redesigning and rethinking writing components within life sciences pedagogy: *“[It is] exciting to think that these undergraduates are finally getting this experience writing, before students go on to graduate school or the industry... it is important... I think I can do something here, can actually help add something to these courses.”*

WIT training offered TAs the opportunity to include writing and reading activities in their tutorials, labs and other classroom settings. A humanities LWTA, for example, enhanced a lecture format with writing activities and newly-developed teaching strategies. One activity used a question or prompt that was followed by a “think first” component and then a two-minute written response. This LWTA believed that this type of WIT activity served to foster both small-group and whole-class discussions, a more effective approach than simply *“just asking the students immediately what they think and having dead air.”*

One TA described using established writing activities to balance course content and skill development:

At the beginning I was really concerned with course material as my sort of big overarching thing... but by the second semester I saw students and their writing style and I felt that at the end of the day we should focus on this a lot more. I ended up, I guess, switching my strategy a little bit and there were a lot more writing activities suggested in our outlines [from instructors] and through the WIT training. As well, there would be suggestions for students practicing writing things. I felt that training helped me to move the way I did my tutorials in a way that incorporated course content and writing. (WIT TA, humanities)

AUTP Peer Trainers also incorporated activities learned from their formal training (and other TAs) that focused on student writing and plagiarism deterrence. One Peer Trainer described a ten-minute activity in which students were provided the first page of several academic articles and instructed to select one sentence from a piece and paraphrase it. *“Well, I did see a marked difference in what I have seen in the past in regards to plagiarism cases, when it came to writing the papers... So every week in class we were modeling effective anti-plagiarism techniques”* (AUTP Peer Trainer, humanities).

Application of techniques and strategies: Interactive teaching techniques. Several AUTP TAs felt that they greatly enhanced student interaction and engagement through the application of activities gleaned from various training workshops: *“I work toward a dynamic classroom environment... and I enjoy deploying techniques that I learned in the [AUTP] program in my classroom”* (AUTP TA, social sciences). One AUTP Peer Trainer said this about their training and its positive impact on their work as both a TA Trainer and as a TA to students:

I think some of the things here that I have learned in terms of interacting, it may be more – it's not content, it's more about student interaction... My role as a trainer is definitely different than my role as a TA in a class... what I think may have changed is the way I interact with students in the classroom. (AUTP Peer Trainer, physical sciences)

In a similar way, another Peer Trainer noted that AOTP training addressed the theoretical rationale behind incorporating more group discussions and reducing the amount of time focused primarily on lecturing and note taking. In short, the Peer Trainer realized the importance of engaging more actively with students: *“People don’t realize that they should probably stop talking and start listening a bit more”* (AOTP Peer Trainer, physical sciences).

Many Peer Trainers discussed their rationales for using interactive teaching techniques. Here, a trainer discussed “paired interactivity” in the classroom:

Students that teach others have higher retention and that is something I have worked on in order to better my own teaching.... even in pairs, students can almost always drastically improve their performance just by conferring with one other classmate, than by themselves. What I tell my students is, two brains are better than one and it’s almost always far more effective for them to collaborate. (AOTP Peer Trainer, humanities)

Two Peer Trainers shared how they integrated interactive teaching activities into their work as TA trainers as a means to lessen their own teaching anxieties. One of these respondents had learned to carefully address and explain the strength of using these teaching methods, and found that TA workshop participants became much more open to understanding the benefits (AOTP Peer Trainer, humanities). A second Peer Trainer utilized interactive teaching approaches in departmental training to ensure that the sessions were not abstract, a concept that the trainer struggled with as a first-year peer instructor: *“it’s both idealistic but also practical”* (AOTP Peer Trainer, humanities).

Peer Trainers reported using a number of other examples of interactive and student-focused activities,²⁰ such as the “jigsaw.”²¹ As one AOTP TA noted, *“It really generated a lot of energy. At the end of the year when I did my sort of informal evaluation thing, a lot of them said that that was their favourite tutorial”* (AOTP TA, humanities).

One humanities Peer Trainer reported that they were fortunate to draw upon a range of teaching strategies when faced with little or no direction in leading tutorial sessions, except to *“cover the readings and lecture material.”* This trainer included Think-Pair-Share to explore research paradigms (*“a rather complex theoretical topic for second year students”*), and rewriting sentences to practice paraphrasing from an article. Another Peer Trainer successfully incorporated the cooperative learning structure “3-Step Interview”, in which each group member represented one of the paradigms and each student left the tutorial with a framework tool for an upcoming assignment. As a result, the Peer Trainer drew more students to the tutorial (which had no grade attached to student attendance) than had attended the course lectures.

One Peer Trainer encouraged students to work together with a different person for each paired activity and stressed to the class, *“This [sharing] is important because as an accountant you will have to meet someone new and start to work with them in collaborative teams almost immediately so it is practice for the real world”* (AOTP Peer Trainer, humanities).

Peer Trainers also discussed using debate activities in their classrooms. One Peer Trainer felt that such activities served to effectively enhance deep student learning, namely with the student as co-learner and the teacher as facilitator:

²⁰ For more detailed descriptions of each of these interactive activities, please see the Centre for Teaching Support & Innovation (CTSI) website: <http://www.teaching.utoronto.ca/Assets/CTSI+Digital+Assets/PDFs/lct-smallgroup.pdf>

²¹ Jigsaw is a cooperative learning structure where, in this instance, students in small groups were given different primary source documents to analyze and discuss. Students then moved to a larger “expert group” where they developed expertise with others who had read the same document. Returning to their home group, each student presented their article and discussed the key concepts.

I'm a big follower of the concept that once the students or the TAs have the information on the screen or the blackboard, the moment in which they interject, and understand what is being taught is when they start, even in a blank way, debating it. When they start to rephrase, to reflect, to doubt, to question things, to go deeper, or contrast it, and when there is that, I would say 'beautiful!' The moment of class debate is the moment in which those that participate in the debate are sure to retain a lot. And even those that don't like to participate, if they are listening they are going to have an easier time when it comes to remembering things. (AUTP Peer Trainer, humanities)

When TAs incorporated this range of interactive techniques in their classrooms, tutorials or labs, student comments supported evidence of positive and deep learning. An undergraduate student recounted that the course TA often facilitated discussions and, in the process, clarified any outstanding questions regarding lecture content: "*a lot of the students spoke in tutorial and we would often talk to one another about questions we had*" (AUTP Student, humanities). Another student similarly felt that tutorial group work was a particularly meaningful aspect of the course: "*we were asked to talk through some of the readings and answer some questions about the readings, and that helped because some people find other important things that you wouldn't have initially*" (AUTP Student, physical sciences). This latter comment echoed one Peer Trainer's reflection on the importance of creating a comfortable learning context and ensuring student accountability for their own learning:

Sitting down a couple weeks before tutorial and thinking about 'okay what do I want them to walk out of this classroom with?' And, I assume they are not going to want to talk! So one of my favourite things is to put them into pairs or into threes... I like the accountability of that; they can't just stare at each other.... important conversations don't happen unless you have students comfortable enough to raise issues that you can unpack. (AUTP Peer Trainer, humanities)

Teamwork and Collaborative Cultures

Open-ended responses and interview findings illustrated that TAs at all levels shared a range of involvement in planning, designing and delivering the courses via a collaborative teaching team environment. The WIT program structure in particular is designed to advance writing instruction for TAs via LWTA, Course Instructor and TA collaboration. Working in such a discipline-specific environment encouraged regular team meetings to discuss WIT program features and activities. Some of the participants noted the collaborative culture that seemed to be developing through their work, like this LWTA:

I was also looking to see some cultural change in the department around writing instruction and the importance of providing that kind of training, not only for students, but for the professional development of teaching assistants, and I have seen a change there as well. The department started a series of pedagogy lunches and I was able to talk about WIT there and other profs would say 'hey, that moderated marking thing, that sounds like a really good idea, can you tell me a bit more about that', so other instructors became increasingly interested. (LWTA, humanities)

Both open-ended responses and interview findings further illustrated the value that AUTP TAs and Peer Trainers placed on learning from one another in a culture of sharing. Such interaction was often framed as strengthening both participant groups' confidence as teachers and peer collaborators. Two main themes emerged from the AUTP and WIT data: the opportunity for and value of collaboration and the effectiveness of peer-to-peer support.

Course collaboration. AOTP and WIT survey and interview data indicated a high degree of teaching team collaboration to deliver course material. Interview data from Course Instructors demonstrated the value placed on collaboration with TAs regarding course development and delivery. This was often evident in large courses, where a team of TAs worked to support the course. One Course Instructor noted, “[TAs] were a steady force, driving the course and we needed them” (WIT, physical sciences). Another Course Instructor noted that TAs brought forward valuable expertise in the course collaboration process:

We worked as a team because we could help each other, in several different ways. It was my first year teaching the course so I was very interested in hearing from them what worked and what didn't work in the experiences they had. Some areas of the course I was more familiar with, other areas they were more familiar with. (AOTP Course Instructor, humanities)

Benchmarking sessions in particular illustrated strong evidence of course cohesion and collaborative work. One Course Instructor stressed that two mandatory three-hour benchmarking sessions ensured that all the TAs marked questions online together before marking alone: “*The teaching team kept in regular contact with the TAs however because it was a new system for them [WIT], TAs could contact us [Course Instructors] at any time to go over examples*” (WIT Course Instructor, life sciences).

Similarly, a physical sciences WIT TA described attending up to ten TA benchmarking sessions that often involved:

[The] entire team (instructor and TAs)... and every time there was a new assignment for marking and when the actual project started for when we were scrum-masters, we would have a bunch of meetings to talk about any issues or how exactly we were going to go ahead and mark the different phases of the project.

Two WIT Course Instructors reported that the TAs' integral role in WIT has meant an improvement in overall course quality and a unified team effort to continually improve the course:

...because it has forced us to scaffold skill development. Prior to WIT it was often, for us as instructors, about getting across the content in an interesting way, not so much about skill development. And we find that the tutorials are really central to the planning, whereas before they seemed more like an afterthought, after doing the lecture. (WIT Course Instructor, humanities)

In a similar vein, one AOTP TA felt that they learned a great deal from working with the Course Instructor on grading tasks that involved a discussion about student assessment and learning. The TA described involvement in a two-way, active and dynamic team teaching culture:

It was not a passive TA-ship... I actually had some input. I gave [the Course Instructor] feedback. Say when I marked the midterm tests. After... we sat together and discussed the marks, the type of mistakes the students made, why they actually made those mistakes, I guess for say an hour each [midterm test]... It wasn't really a passive type of TA, where the instructor just gives me the problem set, and then I go to the class and solve them. No, I actually had some input. Contrary to other tutorials sometimes you don't get to have a voice, but in this one, yes I did have a voice. (AOTP TA, physical sciences)

Likewise, an AOTP Course Instructor noted how both the instructor and the TAs play important roles in instructional improvement:

So I talk to them about the challenges involved in leading a discussion in a way that is respectful of students' differences and points of view but also tries to achieve a certain amount of coverage of the content of the course in tutorial. So it's mainly by way of informal

conversation and then picking up on feedback they offer as the course unfolds. (AUTP Course Instructor, humanities)

Interviews with Course Instructors, Peer Trainers and TAs did however mention a number of constraining factors that may pose obstacles to a more collaborative course team environment. A few respondents across all these participant groups noted that they worked to provide the best support for their students, but time constraints and the desire to “fit everything in” the curriculum often worked against deep learning. AUTP and WIT TAs in particular reported that time is also a factor in the willingness and ability of Course Instructors to properly train and mentor TAs. In some cases, Course Instructors are not as aware of the need for TA training and collaboration, as they may have received little pedagogical training of their own. As well, in some cases Course Instructors had not been in regular dialogue with TAs and were therefore not aware of the experience or pedagogical training that these TAs brought to their roles as members of the teaching team.

TAs’ peer-to-peer support. Survey data showed that many TAs met regularly with other course TAs. Qualitative data further illustrated that strong peer-to-peer support existed amongst TAs. Interviews with TAs elucidated more fully how they relied on their peers to deliver the course material:

We [course TAs] actually judged them [problems sets] beforehand ourselves as opposed to them training us... there was a lot of collaboration, talking back and forth, which was then helpful when we were later on marking the submissions. (WIT TA, physical sciences)

AUTP micro-teaching sessions prepare AUTP TAs for a range of classroom learning contexts, and one Peer Trainer felt that these sessions promoted many positive and fruitful learning experiences between TA participants:

It was really clear to me that people understood the spirit [in which] the micro-teaching sessions were meant to be conducted. People... were offering feedback in a non-judgmental way, but just speaking from their perspectives as learners.... I was sort of on guard for like some messy episodes where people would be really opinionated, but everyone was so respectful in their feedback – it was really cool to see how jazzed people were to get like ideas from feedback. (AUTP Peer Trainer, humanities)

For one AUTP Peer Trainer, a good mix of first-year and experienced trainers meant that they could better address and deal with anxieties in teaching. The respondent also felt that informal networking opportunities occurred during workshops, and this is an area that can be enhanced and developed. One particularly helpful learning exchange occurred when she was paired during her first workshop with a very experienced TA who excelled at TA training.

AUTP Peer Trainers are responsible for overseeing a number of TAs, and one trainer described building a supportive learning environment and how to “*get everybody to act as a team without me imposing. So I think that went well because I... think they felt comfortable... were prepared in a sense, as much as I could prepare them, but I didn’t get the impression that they [felt] I was too descriptive*” (AUTP Peer Trainer, physical sciences).

One LWTA felt that the WIT program offered a collaborative environment as well, one that helped to address what was described as a “*fairly isolating [graduate experience], both in the context of doing my own research but also in the context of teaching.*” The respondent described anxiety in asking questions about how and what to teach in the beginning of a TA appointment. However, through the WIT program, this fear of requesting help was greatly alleviated: “*we need this kind of community... it’s such a relief to find out that my peers had similar questions.*”

Career Orientations and Transferable Skills

The language of “transferable skills” is embedded within the larger proposed “skills agenda” for higher education, which seeks to emphasize questions of employability in relation to the traditional components of a liberal arts education (Assiter, 1995; Fallows & Steven, 2000). While the discourse of “skills” is closely aligned with the larger shifts within post-industrial “knowledge societies,” within higher education it also signals an increased emphasis on the pragmatic application of knowledge. The skills discourse emphasizes that students should not only be able to think critically and make intelligent, informed and discerning choices as citizens and consumers, but they should be able to actively engage in the solving of problems through the innovative application of knowledge. Within this framework, transferable skills are a key concept. Transferable skills are:

preferred when people are talking about the application of skills across different social contexts. Skills in interpersonal communication, management skills, and collaborative group working skills are all perhaps examples of this kind. (Bridges, 1993 p. 45)

In this way, transferable skills are not a discrete and identifiable set of abilities. Rather, a “transferable skill” reflects an orientation that demonstrates the ability to imagine the utility of a particular skill across diverse contexts.

All Peer Trainers and TAs were asked to address their immediate and future career goals and aspirations. While most interviewees indicated that a tenure-track position was of interest, they more often reported that both AOTP and WIT programs offered opportunities to enhance their teaching for future instructor positions/roles, although it was unclear if these roles were envisaged as sessional, teaching-intensive, or a traditional tenure-track research and teaching position. Several Peer Trainers did express a sole focus on a tenure-track pathway. Overall, the majority of all TA respondents felt apprehension about the current academic job market and openly stated they would pursue a few different career options. As senior-level graduate students, Peer Trainers tend to have more experience in the teaching and education environment and more generally shared a realistic or pragmatic aspiration. For example, their experience as trainers created an interest in conducting educational research and pursuing a career in teaching centres, for example.

One humanities LWTA sought their WIT position to help find future employment and thought that this particular discipline-specific writing experience provided skills relevant to “*any number of jobs that I can see myself in*” (LWTA, humanities). A second LWTA felt that the program made the possibility of a teaching career more tangible, further emphasizing that “*skills like leadership, logistical planning, implementation and teamwork are useful in any career*” (LWTA, life sciences). A third respondent noted that WIT employment has offered “*a different perspective than what most people have*” on teaching, and will enable a unique perspective in a potential academic career (LWTA, physical sciences). A humanities LWTA shared that WIT employment has promoted a career interest in the areas of curriculum design, undergraduate teaching and faculty development. Moreover, this participant expressed an interest in academic teaching rather than research and a desire in the long term to adapt the WIT program to another university setting (LWTA, humanities). Two LWTA from different disciplines echoed the value of their enhanced writing skills in choosing a future career path. The first commented as follows:

The incredible amount of organization and project management I’ve had to do is going to be, hopefully, helpful. I am job hunting right now.... Basically, what I want to do is stay really closely connected with the scientific community but, sort of, leverage what I am good at, which is writing, speaking, presenting. (LWTA, physical sciences)

The second participant noted, “*Even if I don’t go into teaching or professorship position, maybe I can do something like writing consulting, and I think [the WIT program] is great for that*” (LWTA, humanities).

Beyond the specific roles and responsibilities that LWTAs fulfilled in their departments, several respondents noted that they greatly enhanced other professional skills:

[What I am] taking away might not have to do so much with writing or anything, it's more about dealing effectively with a huge amount of people who come from really different backgrounds and are interacting with you on so many different levels. There are instructors, there are your professors, there are – you know it's all the way from my peers to the most senior person in the department. (LWTA, physical sciences)

This participant described their growing confidence through these varied interactions in the department. Such confidence was deemed an important quality that could be readily transferred into any work environment. Another LWTA hoped to have a teaching career and WIT program involvement served as one way to learn more about it: *“There aren't a ton of opportunities for grad students to develop their professional skills so that the ones that are available, you have to make the most of”* (LWTA, humanities).

One TA noted that the AOTP certificate helped build a “toolbox” of skills that included confidence and professionalism. This personal and professional development has, in the TA's opinion, *“made me more reliable in my TA role”* (AOTP TA, humanities). Another TA stated that developing a teaching dossier and job interview skills has enhanced opportunities for finding an academic career (AOTP TA, humanities). This finding was echoed by another TA:

I think actually a lot of things in the AOTP certificate are really helpful in understanding what TAs need in terms of support and direction. So that if I'm in a position in the future of supervising TAs, as I probably will be, I'll have a better sense of how to do that effectively, which I think is really useful. (AOTP TA, humanities)

The majority of respondents described the wide range of transferable skills they could carry forward from their AOTP or WIT experiences. It was felt that these abilities would be instrumental in broadening their work horizons after they complete their degree programs. Peer Trainers in both AOTP and WIT emphasized the specific training benefits that they had received, in particular to their own writing skills and confidence as writers. One WIT TA noted:

The WIT training is all about, like you know, improving your writing, and you know, as part of being an engineer for any role that you do, be it software or hardware or whatever type of engineer, writing technical design documents is a very important part [and] now as well when I will be going into the work force I will have to do that... it's definitely very important. (WIT TA, physical sciences)

When asked whether WIT activities impacted/influenced their own writing, another TA responded:

Definitely, for sure. Going through the process and the WIT meetings like marking together I could see how the LWTA, Course Instructor and other TAs nitpick a paper, the way that was so different for me and the whole marking process was really helpful to me, 'That's a really good paper! Look at how it's organized' and 'That's a real jumbled paper', and that helped me to improve my own writing. Never really been worried about my own writing but my approach has changed and WIT has helped in that. (WIT TA, humanities)

A LWTA reported that TAs really *“bought into the WIT program”* once the University Writing Coordinator stressed:

'That what you are learning, the writing strategies, [are] actually of value to you as well'...and that often many of them mention how they wish they knew the strategies during their undergrad. That

motivation, really seeing the value themselves, motivated them to say this is a positive and I want to do a good job. I think they really saw the value in it, they became believers in it. (LWTA, humanities)

One TA summarized a broad set of reasons to complete the AOTP certificate program that focused primarily on developing a teaching portfolio and “*group facilitation skills and things like that are always useful and are applicable in the classroom and elsewhere*” (AOTP TA, life sciences).

Planning and time management. Previously in this report, we highlighted time management themes drawn from open-ended TA survey responses. Interview participants further elucidated that planning and time management skills are important transferable skills enhanced by the AOTP and WIT programs. Three Peer Trainers, for example, described the process by which they learned to design and develop workshop content. One humanities trainer spent about 15 to 20 hours creating the workshop but acknowledged that “*the content only touched the surface of the information.*” A second Peer Trainer (social sciences) admired a previous workshop on course outlines, but in an effort to replicate this session felt that it did not run as smoothly. The respondent reflected upon this experience and its impact on the importance of planning:

It just reminded me that I can't, I personally, and maybe also a lot of presenters and teachers, can't take someone else's product and use it exactly as such. I guess I didn't tweak... it enough to fit my personality. And to a certain extent I don't think I knew the content enough.

A third Peer Trainer commented on the importance of time management as a skill and noted:

I failed to develop that pedagogical knowledge as much as I could have because I burned through my contract hours very quickly. Because I discovered something recently about myself... I'm very poor with time management... a [goal for next year] to learn to be a better teacher, and to work on time management now that this has been flagged. (Peer Trainer, social sciences)

Through their training, each TA arrived at a personal recognition that planning and time management is essential to success, and resolved to improve their abilities in these areas.

A different Peer Trainer noted how time management skills were honed with experience in the program:

I think I really knew how long tasks would take to get them done, so I was much better at planning my work and being realistic about the time commitment for particular components of the program... this year I could say no to certain tasks because I knew how long the others would take. (AOTP Peer Trainer, social sciences)

From these responses, it appears that the AOTP and WIT programs have helped participants recognize limitations in their planning and time management skills, while also allowing them the opportunity to improve and refine these abilities.

Student Learning Stream: Approaches to Teaching and Undergraduate Student Learning

We examined the relationship between TAs' approaches to teaching and students' approaches to learning in several ways among students and TAs in our AOTP case study courses. First, we examined if a relationship existed between TAs' approaches to teaching and students' approaches to learning. We assigned students in

the AOTP case study courses their TAs' change in approaches to teaching scores.²² Specifically, we created variables for all students in the AOTP case courses (n=101) to denote whether their TA reported a reduced use of ITTF strategies and an increased use of CCSF strategies in their teaching. We then ran t-tests to see if there was a difference in students' approaches to learning (surface, strategic or deep) at the follow-up data collection by whether their TA had developed a greater use of CCSF strategies or a lesser use of ITTF strategies in their teaching. We found no difference in students' approaches to surface, strategic or deep learning by their TAs increased use of CCSF strategies or their decreased use of ITTF strategies.

Perceptions of Feedback and Approaches to Learning

A key focus of the AOTP and WIT models is to improve the formative feedback provided to students by TAs. By improving the quality of feedback, it is hoped that students will be encouraged to employ deeper learning approaches.

We examined the relationship between students' perceptions of TA feedback and approaches to learning using OLS regression. We began with a model of students' background characteristics: initial score on outcome measure, gender age and year in school. We then added in measures for the model of TA training and perceptions of TA feedback. We found no statistically significant relationship between students' perception of TA feedback and students' surface and strategic approaches to learning. However, there was a positive relationship between students' perceptions of TA feedback and their deep approach to learning ($B = 0.03$; $p < .05$; $F(6,365) = 21.98$; $p < .001$; $n = 372$). We present the results for the final models in Table 10.

Table 10: Relationship between TA Feedback and Approaches to Learning, n=372

Variable	Surface Learning		Strategic Learning		Deep Learning	
	B	SE B	B	SE B	B	SE B
Initial score	0.70***	0.04	0.83***	0.07	0.73***	0.07
Age	-0.01*	0.01	0.01	0.01	0.01**	0.003
Female	-0.04	0.06	0.13†	0.08	0.15*	0.07
Year of study	0.03	0.03	-0.001	0.03	-0.01	0.02
WIT course	0.06	0.07	0.03	0.07	0.14†	0.07
Feedback	-0.002	0.01	0.01	0.02	0.03*	0.01

Note. $R^2 = 0.54$ for surface learning, 0.58 strategic learning and 0.57 for deep learning.

† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

²² There are several ways this analysis could be conducted. Means could be created from the students in each AOTP case study course and this mean could be assigned to their TA. In this design, AOTP case study course TAs would be the unit of analysis, with the analysis examining the correlation between these TAs' approaches to teaching with the mean of their students' approaches to learning. Ideally, a multi-level regression model would be used in which the variance in students' learning approaches between AOTP case study courses would be predicted using TAs approaches to teaching. However, with only nine case study courses, the sample size was not adequate to use either approach.

Perceptions of Feedback and Student Writing

We also examined if there was a difference in student writing anxiety, self-efficacy and metacognition by students' perceptions of the feedback they received from their TAs, taking into account students' initial scores on the outcome measures, gender, age and year of study.

Students' perceptions of TA feedback did not have a statistically significant effect on student writing anxiety, self-efficacy or students' perception of using metacognitive strategies toward writing. In fact, the only variable with any sort of power in predicting the outcome variables was the students' initial score on the measure of interest.

Although there was little quantitative evidence connecting TAs' approaches to teaching, including students' perceptions of TA feedback, and students' approaches to learning and writing, there was qualitative evidence to strongly suggest that deep student learning opportunities and learning experiences were achieved. WIT student interview data, in particular, highlighted such positive learning processes at work.

Previously in this report we included student perspectives on their TA's use of formative feedback, and in the next section we highlight qualitative interview data in which students themselves identified and discussed their own writing strategies in the WIT course (i.e., evidence of metacognition). Student data also included reflections on their learning experiences and the various roles of the WIT teaching team in this process. One LWTA described one of their specific WIT roles: *"In math, one of our great difficulties is convincing students that their writing matters at all, so we had office hours and I was involved in giving specialized talks in writing in mathematics"* (LWTA, physical sciences).

Focus on Deep Understanding

That same LWTA further shared that it is sometimes very difficult to monitor changes in a student's depth of understanding:

[It is] difficult to understand if they understand it in a deep manner as there is no assessment that gets at it... questions about higher meta-concepts – that's not a [name of discipline] question. The reason is, I've realized more clearly that I can't monitor students' understanding about the subject matter. It's not so hard to monitor students' understanding, what's difficult to understand is whether students' understand in a sort of deep sense of the material, no idea how to monitor that. You can monitor whether they understand it in the sense of, can they write the correct calculations. (LWTA, physical sciences)

Interestingly, one student in this LWTA's discipline reflected on their learning in a WIT course and compared it to previous courses within their discipline. When asked if there were connections between all the important ideas in the course the student said:

Yes, and the good thing about [names the WIT course] I find, unlike [names two other non-WIT courses], you actually learn why you are doing things and how things work in practical application... often in [names a non-WIT course] we would be given questions that were confusing and unclear but that in [the WIT course] they were good in that they would often be word problems with a context, rather than the other course where they would just give you some sort of equation and ask you to "do this" to it, without any reason behind it... this [WIT course] focuses more on the understanding and proving too, rather than just simply doing. (WIT Student, physical sciences)

According to one WIT student, the course TA promoted depth of understanding and ensured there were purposeful links between student readings and tutorials:

Tutorials [held every week] were usually just open conversation about the readings. We had to say one thing we liked and one thing we didn't like and sometimes we got into groups of 4 or 5 and wrote our own definition of [names key course concept term]... tutorials were helpful and kind of solidified the readings. (WIT Student, humanities)

Connectivity

Students were asked in interviews to discuss whether they made any connections between course concepts and, if so, to expand on what this meant for their learning. Most WIT students mentioned a range of connections between tutorials and in-class activities that grew during the course of the term, as reflected by the following student:

Yeah, I mean, most of it was, again, centred around the proofs and proving algorithms and stuff... I found most of the course was really, like, interconnected. Even the first part, like, was deceptively easy, but it kind of led into what we were doing. (WIT Student, physical sciences)

One student focused on seeing connections between all the important ideas:

They were linked together in a very organized and distinct fashion. We started pretty much at the beginning, 'What is [key course concept]?' and then in the next section or lecture he'd link it back. He'd say 'okay remember what we learned about this? Well this attaches to it because of this.' So everything was kind of put together like a puzzle, growing as you went. (WIT Student, social sciences)

Development of Writing Skills

One LWTA's reflection on student learning set the stage for understanding how specific elements of the WIT program can offer enhanced opportunities to deepen student learning and to improve their writing across all academic disciplines. One humanities LWTA shared that current WIT students' level of understanding of scholarship and writing was "*much lower than I expected and if they didn't have the WIT program I'm not sure what they [the TAs] would have done.*" A key challenge identified was figuring out the knowledge base of the students and what they accepted as evidence in their writing assignments. The LWTA noted:

...they [students] would take a direct quote from someone else's conclusion and use that as evidence despite it being their conclusion and having no solid premise. They take the conclusion from the author as evidence and it doesn't come to mind that the author could be wrong. (LWTA, humanities)

When students were asked if they felt they had improved their writing over the course of the year, several students mentioned a range of changes that they had made. They discussed their growth in different ways and frequently cited the TA's role in supporting their writing skills:

It was a learning process for sure since because it was a third year course [and] I had no idea what level of level of writing they expected and I think within my first two assignments I was trying to be in communication with my TA, asking 'well is this what you had in mind?' and she was very much about 'you want to do more analysis rather than re-representing this person's ideas.' (WIT Student, humanities)

Again taking it step-by-step definitely helped. So that it wasn't a huge assignment that was kind of given to you, and looks so large and frightening sort of thing. But taking it step-by-step helped to develop my thoughts, expand on my thoughts and organize things so I could write efficiently. (WIT Student, life sciences)

By the time, for instance I got to the final, I now knew how to write a paper for [this course], at least a bit, where I had no idea in the beginning.... I guess there is different jargon but there even are different ways of structuring things and different ways of analyzing things [across different disciplines]. (WIT Student, humanities)

Another student said that direct assignment feedback was very helpful:

So throughout the assignment there would be margin notes saying, you know either, 'this concept was not defined fully' or 'not defined correctly' and then at the end that would sort of be reiterated. So kind of putting it on me to acknowledge what I did and make sure I didn't do that on the next assignment. (WIT Student, social sciences)

That student further described how writing and related skills development in the WIT course was applicable to other courses and assignments, especially in terms of concept definition and understanding the expectations of university writing:

What was really important for me was that is allowed me to understand social research a lot better. Afterwards, even recently, when I've gone on to read research studies, as like a reading for the week, I can understand what the researcher is talking about. (WIT Student, social sciences)

A different student described their TA's approach to identifying and using primary and secondary sources in assignments. The TA clarified how the student writer should focus more on using primary sources, and should aim to become a secondary source:

That resonated with me a lot. ...What I ended up doing was chucking away all of the secondary source stuff, and just relying purely on the primary source, except for one point, in which case I had to use. But, it changed the direction of my essay immensely, again. But it was a great learning experience. (WIT Student, humanities)

Assignments and Activities

One of the WIT social sciences students described a ten-minute in-class written assignment whereby students were asked to apply course concepts. The student noted that these assignments were similar to what appeared in the course assessment and were helpful in highlighting and integrating important concepts.

A different WIT student commented that the value of the WIT course was that it built on earlier material:

There was a helpful progression of like going from simpler problems to more complicated problems, which I appreciated... well I actually do think that it was, um, a very distinct course in terms of looking at a different way to solve things, especially on geometric problems, that sort of thing, that I had no idea about before. (WIT Student, physical sciences)

Both the professor and the TA played roles in supporting the students in class-related activities. One student noted that the Course Instructor made sure to explain what the assignment requirements entailed. In one instance, the Course Instructor invited the TAs to the lecture to fully explain the course poster assignment and

its grading expectations. The student reported that one of the TAs also posted what was said in lectures about the assignment for anyone who missed the lecture or who was having trouble on the assignment. These posted notes helped a lot in completing the iterative assignment:

He wanted us to do it in stages... one stage where we picked the topic and we briefed what we would put on the poster... so we did that and got that handed back with remarks from the TAs and then it was just the poster itself. (WIT Student, physical sciences)

Another student commented on a group work assignment that took roughly six weeks at the end of the course. He remarked that it taught him a lot about working with other students in a work atmosphere: *“I learned a lot about how other people work and how I work relative to their working habits.”* In addition, the student remarked that a paired assignment was also a unique and productive experience:

Normally with an individual assignment I don't question what I'm doing quite as much. I don't ask myself 'is this right? Do I have any problems with this? Is there something I just didn't think of?' I come to a conclusion and say 'oh that's got to be right' and it's not always right. So I think the pair assignment was very valuable... and I'm just realizing this right now. (WIT Student, physical sciences)

As noted in our second cluster of Student Learning study questions, students reported positively on the role of formative feedback; many noted the role it played in strengthening their assignments and subsequent learning. One WIT physical sciences student commented that feedback was a feature of all the assignments, and was used to demonstrate exactly where improvements could be made. Full assignment solutions were posted shortly after they were due. One student stated that the feedback was generally pretty helpful and *“kind of helped me on the midterm exam because then I wouldn't do, like, the same mistakes over again”* (WIT Student, physical sciences). The participant further added that the feedback helped to determine gaps in understanding and that some of the assignments were interconnected so the feedback would help on future assignments.

Student interviews also identified the effects of tutorials and the activities utilized within them. One AOTP humanities student mentioned that the tutorials were more interactive than other course tutorials and noted: *“I found that beneficial. And I think – I found it really creative as well.”* The student also noted that these types of activities may work best for more mature students:

But students who are fresh out of high school are used to a different form of learning, and a different form of teaching, a different style of teaching that isn't quite so interactive – one that sort of discourages interaction to a certain degree. So becoming an active learner in that sense, a lot of them, I found, weren't very keen to participate, especially in the classroom setting. (WIT Student, humanities)

This same student felt that although many of the students in this class were not familiar with this kind of active participation, the TA should be *“applauded for incorporating interactive activities and presenting in ways to engage students.”*

Study Limitations

Limitations

A number of our study limitations address the scope of the study, recruitment and sampling procedures.

- a) Simultaneous study of two large, complex TA training models added to the complexity of the project management and data analysis.
- b) Necessity of collecting data within the time frame of a single course. This timeframe – particularly in half-year courses – may not have been long enough to fully measure the impact of the intervention on the learners, in particular the undergraduate students.
- c) Recruitment challenges for some participant groups, despite incentives and use of a range of planned and emergent strategies for increasing participation. Due to the timing of the data collection procedures (e.g., post-term and during summer months), our respondent expectations were not always met, particularly with student interview participants.
- d) Multiple participant survey entries occurred as some respondents may have participated in two different roles (e.g., TA and Course Instructor).
- e) Errors in the sampling procedure as undertaken by third-party data collector. Errors were corrected for initial data collection for student spring term courses.
- f) The purposive sampling procedure may have introduced a small measure of sampling error to the study.

Delimitations

We purposively focused on two TA programs – AOTP and WIT – because they represent a centralized program and a division-specific model. Both of these models have also been underway for a number of years and represent two different models or approaches to TA development, but with similar principles that enhance the TA role, utilize peer-supported programming, operate within a range of disciplines, teaching and administrative contexts, support student learning, and develop core skills and competencies for TAs.

Finally, our research team experienced a number of personnel changes throughout the two-year project that, to some degree, created challenges in study coherence, communication and continuity.

Conclusions

This study aimed to examine the influence of two teaching assistant models – AOTP and WIT – on both student and TA learning. Both of these TA models aim to improve undergraduate student learning by ensuring that TAs are integral members of the teaching team and that they receive sufficient training and guidance in order to effectively support deep student learning.

The study was comprised of two broad streams of inquiry: 1) a TA learning stream, and 2) a student learning stream. In the discussion below, we address the key study findings and integrate the quantitative and qualitative insights related to cluster foci. We then summarize what has been learned and the implications from these findings for practice, policy and future research.

TA Learning Stream

TA Breadth of Responsibility and Approaches to Teaching

We found a relationship between breadth of teaching responsibilities and decreased use of ITTF strategies at the follow-up than was reported at the initial data collection. TAs who reported a broader range of teaching responsibilities reported using less ITTF strategies in their teaching. We also found a relationship that approached our identified threshold of statistical significance between breadth of teaching responsibilities and use of conceptual change/student-focused strategies. Again, TAs who reported a broader range of teaching responsibilities reported a greater use of CCSF strategies over time.

It would appear that TAs who have a broader set of teaching responsibilities seem to develop over time a teaching approach that reduces its focus on information transfer (without eliminating it, as this is appropriate for certain times) and increases its focus on asking students to think about course content in conceptual terms.

While no difference was found between Peer Trainers and TAs in their use of ITTF strategies at the initial data collection based on ATI scores, Peer Trainers from AOTP and WIT reported using fewer ITTF strategies at the follow-up than course TAs. In terms of using CCSF strategies, Peer Trainers reported using more of these strategies both at the initial and follow-up data collection points than TAs.

These findings seem to indicate that Peer Trainers, over time, rely less on information transfer/teacher-focused approaches to teaching and use conceptual change/student-focused approaches more frequently than TAs. This finding is encouraging in terms of the development of a pedagogical trajectory but may also be expected given the fact that Peer Trainers have been selected to serve as role models and trainers likely because of their comfort with using pedagogies that acknowledge (and perhaps even prioritize) students in the co-construction of knowledge.

Recommendations

- 1) Provide TAs with a broader range of responsibilities as part of the teaching team. By engaging in more aspects of teaching, TAs shift their approach to teaching to one less focused on information transfer and more focused on students' conceptual understanding of course content. However, it is also important to consider that "more aspects of teaching" may be related not only to a wider range of teaching roles, but also the kinds of learning opportunities inherent in a given teaching role. For example, within a grading role (such as is provided in WIT training), TAs can have opportunities to develop a range of skills in collaboration with peer TAs, such as benchmarking, learning to provide formative feedback, and so forth.
- 2) Design and formalize training programs for TAs that provide opportunities for progressive development of pedagogical skill sets and create pedagogical leadership opportunities for graduate students (e.g., peer training roles). Such roles support the modeling of effective teaching practices and, in turn, such learning can be shared with other TAs. The two peer training TA models that were the focus of this study, AOTP and WIT, are creating such leadership opportunities, and these leadership roles are associated with a greater use of CCSF. This holds great promise for future deeper learning educational experiences for undergraduate students. Such conceptual change supports deeper learning for graduate students and also contributes to a culture of teaching and continuous improvement for TAs.

TA Professional Development: Writing

We found no quantitative difference in the use of metacognition toward writing or self-efficacy in writing by breadth of teaching responsibilities in this study. TAs with a broader span of teaching responsibility did not statistically differ from their peers with a narrower span of responsibility in their use of metacognitive writing strategies or in their self-efficacy toward writing at the initial or follow-up data collection points.

These findings may raise more questions than answers. One of our data collection limitations was that we know little about what kind of teaching responsibilities TAs had in previous terms, nor about their prior career or educational experiences related to writing. If the TA had four terms as a marking-only TA, for example, then we might expect that this would yield a qualitatively different TA experience than four terms as a writing-focused TA. However, given the fact that we found no differences in either the breadth of teaching responsibility measure nor the amount of TA experience in terms of TAs' metacognition toward writing or their

writing self-efficacy, it seems there may be an opportunity to dedicate more attention to TA writing self-efficacy and metacognition as a potential area of emphasis for future professional development and research.

Recommendations

One would imagine that greater comfort with writing should manifest with extended experience in the TA role. However, the fact that we found no differences in writing self-efficacy and the use of meta-cognitive strategies between TAs with differing levels of TA experience and TAs with greater breadth in their teaching responsibilities suggests an opportunity. Given that writing is a key transferable skill of graduate education, we recommend the following:

- 1) Create programs and initiatives that emphasize self-reflexive engagement in the writing process in addition to developing graduate students' skills in writing. Assessing graduate students' self-efficacy with regard to writing appears to be a fruitful arena for better understanding their use of metacognitive strategies during the writing process and how these strategies manifest in the development of the final written product.

A second stream of this study examined the role of TAs in supporting deep student learning and student development of core skills and competencies. This stream also contained two sub-themes, summarized below.

Student Learning Stream

Graduate Student Pedagogical Learning and Undergraduate Students' Approaches to Learning

The rich qualitative interview and open-ended survey data from all participants in this study (TAs, Peer Trainers, Students and Course Instructors) illustrated the transfer of AOTP and WIT training elements (e.g., interactive teaching strategies, formative feedback) to actual pedagogical practices of TAs, which in turn created educational experiences conducive to deep student learning.

TAs and Peer Trainers recognize the value of their teaching progress and how this connects to their ongoing career paths and professional development. Their detailed, insightful, and articulate reflections on their professional development revealed three major themes related to their pedagogical development as graduate students: (1) *Pedagogical practice* describes ways in which TA participants developed their own teaching philosophies and teaching repertoires as they interacted in various course and TA workshop environments; (2) *Teamwork and collaborative cultures* describe the social environment within a course and also within the peer community that were integral to learning in both TA models; and (3) *Career orientations and transferable skills* highlight ways in which TAs could identify and discuss the applicability and practicality of their teaching and learning experiences to future contexts, including as future university faculty, but just as importantly, for other non-academic career roles.

Data triangulation provided many examples of how the transfer of AOTP and WIT learning supported the integrated work of the teaching team, while also demonstrating how students reaped the benefits of specific educational experiences. Iterative assignments, specific feedback and interactive approaches engaged students as learners, and many of these participants felt that such teaching approaches and strategies supported their learning. At the same time, some TAs expressed frustration that they gained valuable teaching experiences through both the AOTP and WIT programs, but due to some course constraints, they were unable to influence some areas of course design, tutorial practices and assessment. This study found that in utilizing trained TAs there is a greater likelihood that students will receive valuable formative and summative feedback and the course overall can achieve consistent grading practices.

These findings are encouraging in terms of the role that both the AOTP and WIT models play as formal opportunities for TAs to develop their philosophies, professional skills and identities as teachers. The intent of the AOTP and WIT models and their respective training elements are reflected in many of the TAs' practices. Our findings indicate that teaching teams are altering the ways they are thinking about their collective and integrated roles, and how these may provide educational experiences for undergraduate students that are associated with deeper approaches to learning. Courses that incorporate some of the AOTP and WIT elements of best teaching practices are more likely to expose students to deep learning experiences, while TAs gain valuable skills in areas such as using effective assessment methods.

One aim of both the AOTP and WIT models is for participating TAs to learn how to identify and support deep student learning, and develop core skills by taking an active and reflective approach to shaping courses, assignments and class sessions. Trigwell's (2010) research demonstrates that these teaching skills and approaches, once learned, make the TA a more effective teacher in a range of contexts. These contexts include graduate school, academic or other careers where teaching is an aspect of their work, and any context in which they work in a team environment. In support of enhanced teaching cultures in universities, the TAs in this study placed value on their development as teachers while also seeing the potential for the transfer of these valued skills (e.g., time management) to future careers.

The following recommendations are directed at a host of policymakers and program designers. Policymakers include senior academic leaders and graduate faculty who oversee TA work within their department, but may also include provincial policy makers who create funding envelopes to support TA training initiatives. Program designers would include teaching and learning support centres and all faculty who work with TAs.

Recommendations

- 1) Create regular and ongoing opportunities for TAs to have both formal and informal discussions and meetings to discuss pedagogy and course design with Course Instructors and other TAs. Such opportunities allow Course Instructors to learn about the educational experiences and training TAs bring to the course and ensure that the teaching team draws on such training to best integrate the roles and functions of the team to support student learning.
- 2) Utilize TAs as important change agents in developing integrated teaching teams that can more effectively support student learning. As well, structure opportunities for TAs and Peer Trainers to support each other in their pedagogical development (e.g., microteaching, formative feedback). Opportunities for TA peer learning can contribute to strengthening the culture of teaching within higher education.
- 3) Encourage and expand opportunities for TAs to invest in their development as teachers through participation in specific, intensive and ongoing formalized training programs such as AOTP and WIT. As this study demonstrated, both of these programs focus on effective teaching practices (e.g., formative feedback, interactive approaches) and can increase the chance that such practices are adopted and implemented in TAs' approaches to teaching, which in turn support undergraduate students' approaches to learning. Such potential benefits can be highlighted in communications with TAs as they plan their academic and career activities.

Approaches to Teaching and Undergraduate Student Learning

Quantitative findings from this study provided weak evidence that TA approaches to teaching and feedback were related to students' approaches to learning and writing. Yet we found some encouraging evidence that students' perceptions of TA feedback were positively associated with students' use of deep learning strategies. Qualitative data provided further insight to elaborate on this relationship.

AUTP and WIT student interview data, in particular, highlighted positive learning processes at work. Students interviewed in this study shared perspectives on their TAs' use of formative feedback and highlighted the ways in which they identified and discussed their own writing strategies in the WIT course (i.e., evidence of metacognition). Student data also included reflections on their learning experiences and the various roles of the WIT teaching team in this process.

While there was little quantitative evidence that TAs influenced student approaches to learning or the development of writing skills in the limited timeframe of the study, we were encouraged by the analysis of the qualitative data. TAs can have an influence on student learning and perceptions of the writing process; however, given the short timeframe in which this study was conducted (largely over a condensed amount of time within a single academic term), it would be difficult to imagine large changes in student approaches to learning or perceptions of their writing process.

Recommendations

- 1) Writing and feedback on writing as a focus for the work of TAs is an important area for future longer-term studies. In particular, more research is needed on the role of TA and instructor feedback and its impact on student writing anxiety, self-efficacy and metacognition, as important measures of student learning. Given the encouraging qualitative evidence in this study on the role TAs can have on student learning and perceptions of the writing process, this area of focus is important in the continuation of programs such as WIT and the development of other peer training programs that incorporate such teaching dimensions.

We are encouraged by the important insights we gleaned from this study and believe the recommendations that emerged from it provide useful directions and build further momentum related to TA training and professional development. The report includes recommendations that flow from the study findings and have implications and relevance for university and college administrators, instructors and educational developers, specifically those individuals who play some role in TA program/model development, support graduate student pedagogical development and/or support teaching approaches associated with deeper student learning.

Future Research

As with all research studies, the limitations in the present study evolved into ideas of how future research could continue to develop this line of inquiry. One of the points mentioned in the student data analysis was the fairly limited amount of time under examination in the study, largely a term and in some cases a full year. Future research may examine only full-year courses as it is more likely through repeat interactions with the same TA that the TAs' teaching approach would leave an imprint on students' learning strategies.

In addition to expanding the number of courses with the largest span of time, future research may consider enlarging the sample size of courses, TAs and students included in the study. Noted throughout the quantitative data analysis section, the relatively small sample size across several of the learner groups was a limitation. For example, with only nine AUTP case courses, the analytic power to examine the relationship between TAs' approaches to teaching and students' approaches to learning was extremely limited. We suggest future research include a much larger number of courses where a single TA teaches a specific group of students. A larger sample with these characteristics would allow researchers to conduct more powerful multilevel analysis.

Moreover, future research may examine the WIT initiative in its entirety. Rather than selecting a variety of courses and inviting all TAs from these courses, given the size of the initiative, future research may invite all

WIT courses during the study year to participate. Depending on the TA population, this may include inviting all TAs to complete surveys.

Similarly, another limitation was the low number of matched cases within the student sample. Although student recruitment is not a challenge unique to this study, one way to increase the student sample may be to invite students to complete the survey instruments during class time. These data could be used for both classroom assessment purposes with students opting out if they are not interested in having their data included in the research pool.

The present study also examined learners' perspectives of engaging in the writing process. Future research may include measures of actual writing. This type of authentic assessment, scored with expert reviewers using a validated rubric, would be an excellent way to examine the research questions raised in the present study as they relate to the development of writing as a core competency.

Peer Trainers in our study utilized highly effective pedagogical approaches to teaching (e.g., relied on student-focused approaches more regularly). We suggest that studies explore this process more fully to identify factors and experiences that are most influential in their ongoing development as effective teachers.

Given the association between breadth of teaching responsibilities and conceptual change of TAs found in this study (reduced ITTF and increased CSSF), future studies might examine the many ways in which "breadth of teaching responsibility" might be analyzed to determine the optimal variations both within and across TA roles.

Future research may also dedicate more attention to studying TA writing self-efficacy and metacognition as a potential area of emphasis for securing more professional development opportunities. Finally, given the fruitful findings from this study of two specific TA programs, we suggest continued investigation of a range of formal TA training programs, including peer training programs, on the development of TA pedagogical skill development, identity as teachers, and transfer of these skills into future career paths. A focused case study that explores this actual trajectory over time, for example, would provide valuable qualitative data to better understand TA teaching development.

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