

Who are the instructional assistant interns?: Examining the synergy of teaching assistants in first-year engineering course during the pandemic

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Abstract

This complete paper examines the synergy of roles and responsibilities of teaching assistants (TAs) and instructional assistant interns (IAIs) in the remote teaching and learning of the integrated first-year engineering course ENGINEER 1P13 (ENG 1P13).

Viewed through the lens of a community of practice (CoP) [1], this paper explores the best practices of combining TAs and IAIs in a course. A mixed methodology [2, 3] was employed. It consisted of a self-assessment survey regarding TAs (N=50) and IAIs' (N=5) roles, preparation, and experiences, and a follow-up semi-structured interview with TAs (N=15) and IAIs (N=5). Findings showed that synergy between TAs and IAIs revolved around five themes, which include: (i) complementarity of roles, (ii) practical issues, (iii) reflective practices, (iv) professional development, and (v) perceived student engagement. The TAs and IAIs perceived that first-year students' overall learning experience in the course was enhanced.

To further promote such synergy, this study's findings suggested the following: (1) establish consistency and coherence with all instructional aspects communicated to the students; (2) provide clear organization of all teaching and learning updates; and (3) disseminate any instruction-related issues to the specific individual(s) or to the teaching team efficiently and effectively.

Introduction

North American universities have cohesive and established frameworks for the employment of graduate teaching assistants [4]. A very few universities, like McMaster University, employ both teaching assistants (TAs) and instructional assistant interns (IAIs) along with instructors for a course.

With all university classes transitioning online from face-to-face, employing more teaching assistants might prove helpful, particularly for incoming first-year students whose needs outweigh those of students who started a year ahead of them. The seven months between March 2020 and September 2020 were trying times for thousands of young students who missed significant milestones in their final year of high school (sports championship, in-person graduations and proms). Following this, their first months at their chosen universities (extending up to this moment) were fraught with academic, social, and emotional problems.

This paper examines the synergy of the roles of teaching assistants (TAs) and instructional assistant interns (IAIs) in the remote teaching and learning of McMaster University's first-year course titled Integrated Cornerstone Design Projects in Engineering, or ENGINEER 1P13 (ENG 1P13). Unique to ENG 1P13 is the hiring of a significant number of teaching assistants: 150 TAs and 11 IAIs to work alongside seven course instructors and four non-teaching staff to support first-year students (both Canadian and International) during the challenging times brought about by the Covid-19 pandemic.

Both the TAs and IAIs are a combination of upper-year engineering and graduate students. However, IAIs are hired full-time and are responsible for the delivery of weekly labs and design studio sessions, while TAs are hired on a part-time basis for students' mentorship and grading.

Moreover, IAIs are trained broadly on all aspects of the delivery of weekly labs and design studio sessions prior to the start of the course. IAIs conducted numerous test-runs of course delivery and implementation under the guidance of course instructors.

The overarching question in this study was: In what ways do the similarities and differences among TAs and IAIs' roles and responsibilities enhance first-year students' learning experience in an online ENG 1P13 course amid the pandemic?

Methods and Design

This section outlines a brief background of the course delivery, the pedagogical lens of the study, and data gathering and analysis.

Brief Course Context

The regular routine in this online course goes like this: a course instructor introduces a fundamental concept in materials science or computing along with a corresponding activity or design project for all students. Then, each of the 11 IAIs gathers a hundred students or less and breaks down the concept and activity for those students, be it during a lab or design studio

session. Next, 150 TAs meet with students in small breakout groups. Generally, a TA drops into 1-2 breakout groups made up of 2-3 students. IAs work alongside TAs to address specific student needs or queries that may arise during and after the breakout session as well as being available throughout regular working hours.

Design

Using the lens of legitimate peripheral participation in a community of practice (CoP) [1], this study employed a mixed methodology [2, 3]. Using CoP, we examined how TAs and IAs perceived their roles as they worked together to mentor first-year students, and explored how their learning and teaching approaches evolved into new sets of relations in their own sphere of community sustained by members' experience and identity in and out of engineering.

An anonymous online self-assessment survey regarding IAs' and TAs' roles, preparation, training, and experiences was carried out via LimeSurvey in Winter 2021. The questions consisted of 5-point Likert-type ratings of agreement and disagreement and 4-point ratings of significance from not significant to very significant.

Overall, 50 TAs and 5 IAs completed the survey, representing 33% of the total TAs and 45% of the total IAs. The survey responses were analyzed using general descriptive statistical analysis like percentages and tallying. Moreover, findings from a check-in survey given to ENG 1P13 students in November 2020 to assess how they perceived their engagements with TAs and IAs were used as supplementary data.

Individual interviews via MS Teams were conducted in Winter 2021 to enrich the findings of the self-assessment survey. A total of 15 TAs and 5 IAs joined the audio interview, each receiving an honorarium for their one-hour participation. Interview responses were coded related to how individual TAs and IAs: (i) complemented one another's roles and tasks and their perception of first-year students' learning engagement; and (ii) reflected on how TAs and IAs addressed practical issues (like managing conflict), personal issues (like reflective practices), and professional development issues (like pedagogical training). These themes were matched with the results of the online survey to come up with a final analysis.

The questions introduced in the online survey and individual interviews were based on the course syllabus, literature reviews on graduate teaching assistants in the context of North American universities [4], and validated teaching competencies for graduate teaching assistants [5]. To promote trustworthiness in the mixed methods study, both the survey and individual interviews including the preliminary qualitative and quantitative data analysis were conducted by the first author, who is not part of the course's teaching team.

Results and Discussion

Five emergent themes were extracted from the combination of results of the survey and individual interviews. These themes were: (i) complementarity of roles, (ii) practical issues, (iii) reflective practices, (iv) professional development, and (v) perceived student engagement.

Complementarity of Roles

TAs and IAIs strongly agreed that they have the competency to teach content or learning materials suited to the background, ability level, and interests of students at 92% and 100%, respectively. In a remote teaching setting due to the Covid-19 pandemic, 98% of TAs and 100% of IAIs believed that having the competencies to manage and assist with the learning needs of students in teams and groups, enhancing students' motivation and learning engagement with the course, and communicating effectively with course instructors and fellow TAs and IAIs were very significant.

However, since TAs were not working full-time, they faced gaps regarding information communicated between IAIs and students during the week. Thus, during their scheduled breakout group mentoring sessions with the students, TAs could not fully facilitate activities and deliverables that had been discussed during labs and design studio sessions with IAIs. This is one of the hurdles seen during the early stages of the course that limit coherence and consistency in the teaching and learning between students and teaching assistants.

To address the issue, TAs and IAIs themselves agreed to conduct weekly updates regarding the course. Weekly updates were led by IAIs and repeated twice in a day to accommodate all 150 TAs with different schedules. These updates were organized by folder and made accessible to both TAs and IAIs. Weekly updates also served as a venue to share and brainstorm best practices. Furthermore, during the week, TAs were encouraged to join their breakout group sessions with students 15 minutes earlier so that IAIs could provide last minute briefings and debriefings if necessary.

Practical Issues

All 15 TAs unanimously expressed high regard for the expertise and efficiency of their IAIs, while the 5 IAIs complimented the TAs as very responsible when it came to marking students' work, responsive to student needs, effective at channeling concerns and communication, and receptive to new ideas and approaches. Equally importantly, these TAs and IAIs gladly described their own workload as very manageable and satisfying, and stated they are well-paid.

While both TAs and IAIs exchanged positive regard for each other, there were existing practical issues that both should be aware of to consistently achieve the course learning outcomes. To establish efficient and effective dissemination of information to the right person, for instance, TAs suggested that each IAI should provide their own brief profile (e.g., expertise, engineering discipline, strengths, etc.). That way, when TAs in breakout group sessions encountered student questions that only IAIs could address, these questions could be sent directly to the right IAIs. TAs described instances where questions were directed to an IAI whose expertise did not allow them to answer, in which case the TA had look for another IAI. Between crafting the question, sending it to the IAI, receiving the initial reply back, and continuing to search until the right answer was found, significant instructional time was lost.

For their part, IAIs stressed that TAs should feel free to provide them with the latest information on any teaching and learning issues at any time rather than waiting to report them during the

scheduled weekly updates. TAs should also not hesitate to inform IAs regarding any discrepancy in marking rubrics within the soonest time possible.

Reflective Practices

Working as a teaching assistant (TA or IA) during the pandemic was an immense challenge when it came to achieving course learning outcomes, but it was also a significant opportunity to grow into a teacher and mentor. These TAs and IAs were able to reflect on the value of developing empathy skills to understand students' and instructors' points of view and circumstances, particularly amid a pandemic. Moreover, by engaging with their fellow TAs and IAs in a community of learners, they were able to harness the art of effective communication, which is one of the more important performance skills future engineers should develop.

Professional Development

Drawing from experiences in mentoring students and delivering labs and studio design sessions, marking students' deliverables over time allowed TAs and IAs to dive deeper on best pedagogical practices to improve teaching and learning in engineering education. TAs and IAs have identified these pedagogical practices to include the following: (a) showing extra understanding of first-year students' situations as impacted by the pandemic (e.g., different time zones, social and emotional issues, technical and technological issues); (b) providing constructive feedback to students while remaining consistent in addressing matters of discipline; (c) exhibiting respect and fairness for the class during breakout group sessions; and (d) enhancing students' motivation by sharing personal learning experiences to demonstrate the relevance of the course to future goals.

Perceived Student Engagement

Near the halfway mark of the semester, a check-in survey was given to first-year students in November 2020. A total of 657 students responded to the survey. It showed that while first-year students had started to acknowledge the increase in their course workload, most students (85%) were feeling engaged (combinations of engaged, engaged most of the time, and always engaged) in lectures, labs, and design studios. This level of engagement aligns with their perceived engagement with their TAs, IAs, and instructors, with an average of 86% (with TAs at 84%, IAs at 89%, and instructors at 86%, respectively).

While TAs and IAs saw that students were engaged actively in smaller groups and exposed to different perspectives and approaches to understanding content, there were some organizational and administrative aspects of the course that TAs and IAs must consistently observe. For one, they must establish consistency in the interpretation and implementation of marking rubrics for every deliverable. They should also organize all communication with students as well as weekly updates, changes, etc. related to the lab and design studio sessions by weekly folder. Particularly for TAs who are not available throughout the whole week, this organization will keep them informed and assist them in following, monitoring, reviewing, and preparing for their weekly mentoring sessions with students. A TA who is uninformed about these circumstances will create a chain of confusion among TAs and students.

Conclusion

Examining the synergy of TAs' and IAs' roles, responsibilities, etc. in ENG 1P13 through the lens of CoP allowed us to see how "new-comers" to a practice (a term that could be applied to both TAs and IAs) develop knowledge that leads to the mastery of becoming "old-timers"[1]. The synergy of the roles of TAs and IAs in a large integrated online engineering course for first-year students amid the pandemic was seen to revolve around five aspects: (i) complementarity of roles, (ii) practical issues that needed to be addressed, (iii) reflective practices to enhance personal growth, (iv) professional development essential for future engineers, and (v) perceived student engagement in the course.

The synergy between TAs and IAs allowed them to work together to help achieve the learning outcomes set by the course instructors. They streamlined and divided workloads which allowed them to attend to students' needs individually or in smaller groups. The TAs and IAs provided students with multiple scaffolds to access learning resources and different perspectives of doing and thinking, break down difficult concepts and their applications in labs and design studios, establish a feeling of belonging to a team and community (particularly during the pandemic), and potentially achieve the course learning outcomes set by the instructors.

To further promote the synergy between TAs and IAs, the following key suggestions should be considered: (1) establish consistency and coherence across all instructional aspects communicated to students; (2) provide clear organization of all teaching and learning updates by filing them in weekly folders to achieve the former (consideration number one); and (3) disseminate any instruction-related issues to the specific individual(s) or to the teaching team efficiently and effectively.

The TAs and IAs helped one another develop performance skills crucial for them as future engineers, such as communication abilities, interpersonal interaction, conflict mediation, team performance, understanding of a technical culture, and sensitivity toward diversity [6-9]. In return, these performance skills allowed TAs and IAs to perceive that first-year students' learning experience in the course was enhanced.

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