

A Multiple-Case Study Exploring the Experiences of International Teaching Assistants in Engineering

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Dissertation submitted to the faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

in

Engineering Education

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June 20th, 2018

Blacksburg, VA

Keywords: International Teaching Assistants, Intersectionality, Multiple-Case Study, US Engineering Classes

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ABSTRACT

Many international graduate students serve as teaching assistants at US universities. As teaching assistants, they carry out significant responsibilities such as leading lab sessions, grading student work, holding office hours, and proctoring exams. When these international teaching assistants (ITAs) cross national boundaries to teach at US universities, they may experience significant differences in the educational cultures. Teaching in a new educational culture offers ITAs both challenges and opportunities for growth.

To better understand the experiences of this population within engineering, data were collected from seven engineering ITAs using a multiple-case study approach with each ITA representing a case. Data were collected in the form of weekly reflections and in-person interviews at the beginning, middle, and end of the semester, at an R1 university representative of national averages in terms of international graduate student population in the US. The participant pool represented diversity in the form of nationality, gender, prior teaching experience with the same course, and engineering discipline. Data were analyzed using both *a priori* codes and inductive coding emerging from the data, with particular attention given to experiences specific to engineering.

Based on data analysis, codebooks were developed that operationalize ITAs' experiences and navigational strategies in the context of engineering. While illuminating the intersections of ITAs' teaching experiences with their international and GTA identities, the results point to the complexity and variations in participants' experiences based on various social and contextual factors such as gender, cultural background, prior exposure to the English language, prior engagement with the course material, and interaction with the teaching team.

The results point to several contributions, and implications for engineering departments and universities, faculty, and ITAs to better engage ITAs in the process of undergraduate engineering education. In terms of contributions, this study uses intersectionality, a critical framework, which accounts for the complexity of engineering ITAs' experiences to provide systematic accounts of their experiences and navigational strategies while illuminating the nuances related to social, cultural, and disciplinary identities. Implications for the engineering departments and universities include creating an educational environment that values the cultural and linguistic diversity brought by ITAs, and collaborating with ITAs to organize training programs that help ITAs strengthen their communication, workload management, and intercultural skills; those for faculty include helping ITAs manage their teaching and research requirements by allowing for flexibility in ITAs' schedules, and treating ITAs as budding colleagues by using ITAs' existing pedagogical knowledge and scaffolding them when needed; those for ITAs include resisting the institutional pressure to "fit" into the US educational norms by using the pedagogical and cultural knowledge they bring from their home countries to better support student learning, and develop students' intercultural skills; and those for undergraduate students include engaging with ITAs to learn the engineering course content and simultaneously develop intercultural competence.

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GENERAL AUDIENCE ABSTRACT

In light of the pivotal role played by international teaching assistants (ITAs) in undergraduate education at US universities, particularly in engineering, this research explores the experiences of engineering ITAs. When ITAs cross national boundaries to teach at US universities, they may experience differences in teaching and learning practices. These differences present both rewards and challenges to ITAs. Prior research has explored the rewards and challenges of the ITA experience more generally, but this work has not addressed the unique experiences of ITAs in engineering. Hence, it is important to understand ITAs' experiences and navigational strategies from a viewpoint that highlights both the issues faced by ITAs and their strengths so that adequate steps can be taken to better engage them in undergraduate engineering education in the United States.

To this end, this research focuses on exploring ITAs' teaching experiences, navigational strategies, and the influence of ITAs' social identities on their experiences. To address these research problems, data were collected from seven engineering ITAs at a large research-focused university for a semester of their teaching. Data were collected from these ITAs in the form of weekly reflections and periodic interviews. Data were analyzed using existing work on ITAs' experiences as the starting point. The starting framework was then modified to capture the themes emerging from the data, with additional attention given to engineering specific nuances.

The findings point to several contributions and implications for practice. In terms of contributions, this research illuminates the complexities of engineering ITAs' experiences by highlighting both advantages and disadvantages experienced by them while expanding on our existing understanding of ITAs' experiences. In terms of implications, the findings of this research suggest that efforts should be made at the institutional level to create an environment that values the cultural and linguistic diversity brought by ITAs, and collaborate with ITAs to improve their communication, workload management, and intercultural skills through focused training programs. Faculty working with ITAs should build flexibility into ITAs' schedules so that ITAs can pay attention to other personal and professional responsibilities. Also, faculty should treat ITAs as budding colleagues by using ITAs' pedagogical inputs and scaffolding them when needed. ITAs should use the pedagogical and cultural knowledge they bring from their home countries to better support student learning and develop students' cross-cultural skills, and thus resist the urge to assimilate into the US educational culture. Finally, undergraduate students should see the presence of ITAs in their classrooms in positive light and engage with ITAs to learn the engineering course content and simultaneously develop intercultural skills.

Dedication

To Sharda – my grandmother.

To Sharda – the Goddess of knowledge.

Acknowledgements

Like most human endeavors, this dissertation is also a collaborative effort. There have been so many interactions and conversations with different people that I have had since I started my PhD in Fall 2014 that have shaped this work into what it is today. But there are some people without whom this research would have not been possible.

My PhD advisers, Drs. Lisa McNair and Marie Paretti – for guiding me through this research. Starting from formulating the research questions to collecting data to conducting data analysis to writing this manuscript, your impressions are present in each process. Also, many thanks for providing the financial support to get the interview data for this research transcribed. Also, thanks to my committee members, Drs. Jenny Lo and Amy Nelson – for supporting this study from the get go. This research would not have been the same if you had not challenged me by asking the difficult questions starting from its conception.

My colleague, Amy Hermundstad Nave – for helping me with peer reliability check during the data analysis process. Your feedback and suggestions definitely took me a step closer to more reliably capturing the meaning of the collected data. Also, thanks to many other fellow graduate students for helping in different aspects of my PhD journey.

Dr. Jenni Case – for being a great mentor. Although we have worked together for a relatively small time period, I am very thankful for all the conversations that you have had with me that have pushed me to become a better researcher and focus on things that matter more than others. I cannot wait to start my next phase as a researcher with you.

My mom Kiran, dad Sushil, brother Abhishek and his wife Sahiba – for almost everything I am and I have. You have taught me what love is and how to unconditionally love someone. You have exemplified for me that all that matters at the end is a kind heart. You have always tried your best to help me achieve success and pursue happiness. And hence, a lot of credit for this academic success goes to you. I know there is no way I can repay even half of what you have given to me, but I do know that I love you a lot, and will always do. Also, many thanks to my uncle Pradeep and his family – for all the love and support you have provided in the last five years of my stay in the US.

My friends, Naveen, Hoa, Jordan, Darren, Adam, and Yongce – for sharing my disappointments, frustrations, and sadness, as well as my successes, happiness, and joy. You, at multiple occasions, supported me as my family, and I feel lucky to have friends like you.

The Virginia Tech Graduate Research Development Program – for providing funds to compensate participants in this study.

The research participants – for being with me through an entire semester of data collection. I know being a graduate student is tough – it is a role that requires managing multiple responsibilities. Taking extensive amounts of time away from schedules much have been difficult, I imagine. But all of you managed that responsibility as nicely as possible given your multiple responsibilities of being a researcher, a student, and an international teaching assistant.

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Chapter 1: Introduction

International graduate students form a significant portion of the graduate student population in US universities. Out of 1,782,364 graduate students enrolled at US universities as of Fall 2014, 18.9% were international students (Allum & Okahana, 2016). This percentage becomes higher when we look at in engineering, math, and computer science: 54.5% of the 157,457 graduate students enrolled in engineering in Fall 2015 in US universities were international students, as were 55.5% of 105,033 graduate students enrolled in mathematics and computer science (Allum & Okahana, 2016). In the same year, 54.7% of engineering PhD degrees were awarded to international students (Yoder, 2016). These data demonstrate that international graduate students form a large portion of the STEM graduate student population at US universities. Moreover, the data from the Institute of International Education (2016) suggest that the number of international students at both graduate and undergraduate levels has increased annually since the 1950s.

International students offer multiple benefits to US universities and the education system. They are often hardworking and dedicated (Kuo, 2002) and contribute heavily to ongoing research and development work. International students also add to the richness of cultural diversity on campus. They enrich interaction and dialogue across cultures and among intellectual communities (Mehrabian, Gammoh, Ducharme, & Elshennawy, 2008). They contribute to universities' financial needs by bringing in money through tuition and other fees. Hence, international graduate students are an integral part of US universities.

Most importantly for my research, international students form a large part of the graduate teaching assistant (GTA) pool, especially in disciplines such as math, physics, chemistry, and engineering (Kuo, 2002). The data indicate that 34.6% of international graduate students received their funding from US universities during the academic year 2015-16 in the form of teaching or research assistantships (Institute of International Education, 2016). Many universities, including Virginia Tech, rely on international teaching assistants (ITAs) for a significant portion of undergraduate instruction. As part of their teaching assistantship, these ITAs serve as laboratory assistants, recitation leaders, and graders for tests and assignments. They also sometimes prepare instructional materials, proctor tests, and handle students'

questions and queries. At some universities, these ITAs teach introductory courses in their disciplines as “Instructors of Record.” While working as an instructor of record, they may be required to design syllabi, assignments, tests and quizzes; grade tests and assignments; lead class sessions; conduct office hours; and assign a final letter grade to students at the end of the semester (Plakans, 1997).

In light of the pivotal role ITAs play in undergraduate education, particularly in engineering, a deeper understanding of their experiences can help both researchers and practitioners more effectively support, engage with, and leverage the contribution of this prominent human resource in our education system. To that end, my research uses a multiple-case study approach to capture the teaching experiences of ITAs in engineering, using Virginia Tech as the research site. As discussed in detail in Chapter 3, Virginia Tech is representative of national trends in international graduate enrollment in engineering, and the university is representative of many public research-intensive US universities that have a large international student population, which positions Virginia Tech as a useful site to conduct my study.

This chapter provides an overview of research I conducted to understand the unique experiences of ITAs. The following sections discuss the personal experiences that motivated me to do the study, selected literature on ITAs and international instructors that highlights their experiences and navigational strategies, the need for the study, the purpose and research design of the study, and the significance of the results.

1.1 Motivation for the study

The motivation to study ITAs’ experiences came from my own experiences of being an international GTA teaching the first-year engineering class (Foundations of Engineering, ENGE 1215) in Fall 2014. While I did not have to overcome major linguistic challenges when I started teaching this class, I quickly realized that I had a different worldview toward education compared to my students’ because of my K-12 and undergraduate education in India. While teaching the course, I realized that my students and I had different expectations of each other. I expected my students to take more responsibility for themselves and their learning. For instance, I assumed that my students would ask me questions during or after the class if they did not understand a particular topic. On the contrary, I found that my students expected more from me

in terms of guidance. Based on the feedback from them during and at the end of the semester, I learned that some of my students expected me to tell them when to take notes and when to stop taking notes and when to pay attention to class discussions. I also observed that my students were slightly hesitant to ask their peers for help and support, which was starkly different from own undergraduate education where I extensively relied on peer collaboration for learning new content. Finally, I noticed a higher level of instrumental value attached to education among my students. My students saw their college education as a means to get a good job and advance their careers, something also noted by Kittler (2014) and Lepadatu, Gheorghiu-Stephens and Lepadatu (2011) about the purpose of higher education in the US. On the other hand, my educational experiences in India had taught me to view education as a way to achieve self-development more than as a means to advance my career.

This experience of finding differences in roles and expectations between me and my students led me to explore how one's cultural background influences their pedagogical practices. My initial understanding of culture leading to pedagogical differences was reinforced by Hofstede's (2001) theory of cultural dimensions, which categorized national cultures on four dimensions: a) power distance, which addresses human inequality and relationships with authority; b) uncertainty avoidance, which relates to how societies deal with the unknown; c) individualism, which determines the relationship between the individual and the group; and d) masculinity, which addresses the implications of the biological differences between the sexes. This theory, when applied to educational settings, explains how educational cultures vary in terms of roles and expectations of teachers and students, purposes of education, the ways instruction is delivered, and accepted classroom behavior. A detailed discussion of how academic cultures vary on the basis of Hofstede's cultural dimensions appears in Chapter 2.

Hofstede's theory of cultural dimensions helped me understand my experiences as an instructor and a graduate student at Virginia Tech. At Virginia Tech, I experienced higher levels of individualism compared to my experiences in India. Emphasis was given to individual work and, at times, collaborating with other students on some assignments was considered unacceptable under the course policy. On the other hand, collaborating with my peers was the norm when completing assignments in India.

Besides experiencing higher levels of individualism, I also experienced lower levels of power distance in my interactions with my professors and students alike. At Virginia Tech, I was encouraged to see my professors as colleagues instead of seeing them as the kind of authority figures they represented in my Indian education. At the same time, my students treated me as an equal instead of seeing me as an authority figure in the classroom.

In addition to differences in individualism and power distance levels, I also experienced differences in level of uncertainty avoidance. I realized that my students wanted me to give them extensive details about how to complete assignments and what was expected of them for getting better grades as a way to reduce risk and ambiguity within the class. In contrast, my professors during my undergraduate studies used to give me lower amounts of instruction to complete assignments and perform well on exams.

My experiences, along with Hofstede's theory, led me to the realization that other ITAs might be facing similar situations due to their diverse cultural backgrounds, which motivated me to study the unique experiences of ITAs in engineering.

1.2 Prior work and need for the study

As discussed earlier, ITAs play an important role in US universities, particularly in engineering. Given that they come from diverse academic cultures and, at times, are non-native speakers of English, they have unique experiences of teaching in the US academic system. Understanding their experiences not only helps engineering colleges better support their needs by providing adequate resources for their professional development, but also gives the colleges an opportunity to leverage their pedagogical and cultural knowledge for the development of intercultural competence in undergraduate students taught by these ITAs. A number of researchers previously have attempted to capture the experiences of ITAs at US universities. This prior work on ITAs can be broadly grouped into four categories – challenges faced by ITAs in carrying out their teaching responsibilities (e.g., Arshavskaya, 2015; Kuo, 2002), rewards of the ITA experience (e.g., Trebing, 2007; Zong, 2011), navigating the ITA experience (e.g., Hebbani & Hendrix, 2014; Lepadatu et al., 2011; Mutua, 2014) and portrayal and perceptions of ITAs in the US academy (e.g., Fitch & Morgan, 2003; Gravois, 2005). A full discussion of this literature on ITAs appears in Chapter 2.

While the prior work on ITAs has captured the rewards and challenges of the ITA experience, the ways in which ITAs navigate their experiences, and how they are portrayed and perceived by students and faculty, notable gaps remain. First, prior work on capturing the rewards and challenges of the ITA experience does not take disciplinary differences into account. It looks at the experiences of ITAs across the university. However, a range of studies (e.g., Becher, 1989; Biglan, 1973; Braxton, 1995; Donald, 2002; Stark, 1998) suggest that there are distinct disciplinary differences in teaching and learning in higher education. These differences mean that the research findings from general studies of ITAs' experiences and navigational strategies may not be applicable to ITAs in engineering or any other individual discipline (Luo, Bellows, & Grady, 2000). Second, most of the work on navigation of the ITA experience is autobiographical in nature (e.g., Hebbani & Hendrix, 2014; Hsu, 2014; Lepadatu et al., 2011; Mutua, 2014; Zong, 2011). Though important, such work does not provide systematic accounts of ITAs' navigational strategies using robust theoretical and methodological frameworks to allow for transfer across sites and experiences. Third, there is a lack of critical perspective in understanding the experiences of ITAs. While ITAs enrich US universities by adding to the cultural diversity on campus and helping carry out instructional work, their portrayal in prior research often casts them in a negative light, as described in Chapter 2. ITAs are seen as lacking in knowledge and skills to teach a class (Yep, 2014). As a result, ITA training programs tend to be ethnocentric in that they try to Americanize the ITAs, and at the same time they solicit little input from ITAs themselves about their developmental needs while designing these programs (Zhou, 2009). Thus, the current university system often devalues the cultural and pedagogical skills they bring.

In light of the gaps noted in the previous paragraph, it is important to systematically understand the experiences of ITAs in a way that takes disciplinary differences into account and adopts a critical stance. By understanding the experiences of ITAs in engineering from a critical viewpoint, we will be able not only to understand the disciplinary nuances present in ITAs' experiences and their navigational strategies, but also to understand how the multiple identities of ITAs shape their experiences in the current institutional structure of US universities. At the same time, as Elliott, Fischer and Rennie (1999) note, a systematic study will give us a deeper and more comprehensive picture of ITAs' experiences and their navigational strategies.

1.3 Purpose of the study and research design

Given the need to understand ITAs' experiences in ways that critically engage with their experiences and navigational strategies while taking into account disciplinary differences, this study seeks to understand the teaching experiences of ITAs in engineering at US universities, how ITAs navigate these experiences, and how their multiple identities shape these experiences. For the purpose of this study, I define an ITA as a graduate teaching assistant on a student visa who completed their K-12 and undergraduate education in their home country. The overall goal of the study is to better engage the ITAs in the process of undergraduate engineering education. The study addresses the following questions:

RQ1: How do ITAs describe the experiences of teaching engineering classes at US universities?

RQ2: How do they navigate these experiences?

RQ3: How do ITAs' social identities shape these experiences?

RQ4: What similarities and differences are present across the experiences of ITAs in engineering?

Here social identity is defined as a person's sense of self that is derived from their membership in various social groups (Tajfel, 1981).

To answer these research questions, I used a multiple-case study design, following Yin (2009). The study was conducted with seven ITAs teaching engineering classes at Virginia Tech during a single semester. Each of the ITAs was treated as a case for the study. I collected data using in-person interviews and weekly reflections completed by the participants. These data were used to build individual cases of ITAs' experiences and navigational strategies. I then compared and contrasted these cases to explore similarities and differences among ITAs' experiences and the influence of their social identities on their teaching experiences. Additionally, I used intersectionality as the theoretical framework to analyze how ITAs' multiple social identities intersect with one another to create a complex teaching experience for ITAs. An intersectional lens helps illuminate how ITAs' social identities interact with the institutional structure of US universities and lead to inequities and equalities, barriers and access, and privileges and disadvantages for ITAs.

1.4 Significance of the study

While this study was conducted at Virginia Tech, the findings are relevant to ITAs in a large number of US universities. As discussed in detail in Chapter 3, the university's profile is characteristic of many universities that have a large number of international students. At the same time, the graduate student enrollment in engineering at the university is comparable to national averages. Moreover, the participant pool for this study represents variations in ITAs' experiences by sampling them across nationality, gender, teaching responsibility, engineering discipline, and level of class taught by them, which makes the findings relevant to a large number of ITAs.

1.4.1 Intellectual merit

As discussed earlier, international teaching assistants are an integral part of the US university system. They not only enhance cultural diversity on campus but also contribute to undergraduate instruction. Given the fact that ITAs come from academic cultures that are different from the ones present at US universities, they experience both challenges and rewards from teaching in a different academic setting. In this process, they learn various pedagogical and cross-cultural strategies to navigate their experiences. Researchers previously have captured both the challenges and the rewards of the ITA experience. However, the prior work does not capture the discipline-specific nuances of teaching and learning and predominantly relies on autobiographical accounts of how individuals navigate those challenges. Moreover, prior work on ITAs lacks a critical perspective in that it overlooks the pedagogical and cultural skills of ITAs. This study addresses these gaps in the literature by: 1) focusing on the experiences and navigational strategies of ITAs in engineering using theoretical and methodological frameworks, and 2) taking a critical stance in understanding ITAs' experiences by focusing on how their social identities lead to the issues of power and privilege in the US academy.

The findings of this research expand our understanding of ITAs' experiences by operationalizing an existing framework in the context of engineering, and highlighting several engineering-specific nuances in ITAs' experiences and navigational strategies such as the presence of a shared knowledge of engineering content across the world, the presence of highly mathematical and abstract course content, the use of assignments and course activities that focus

problem-solving with a ‘right’ answer, and the use of ITAs’ own engineering skills to automate some teaching tasks. The results also highlight the issues of power and privilege that ITAs face in the US academy. ITAs experience a lack of power due to both their English competency and the pressure to simultaneously manage both research and teaching responsibilities. At the same time, they have privileges in terms of the pedagogical knowledge they bring from their home countries, and the ability of relate to undergraduate students due to the shared experiences of being students. These intersections of power and privilege complicate and enrich our understanding of ITAs’ experiences to move beyond the deficit model of prior work.

1.4.2 Broader impact

The findings of my research benefit multiple stakeholders associated with a university system, including ITAs, undergraduate students taught by ITAs, faculty working with ITAs, engineering departments that hire ITAs, and universities that are committed to providing opportunities for professional growth and effective learning environment to its students. The overall goal of my research is to better engage ITAs in the process of undergraduate engineering education. This goal is achieved in three ways through my study. First, the findings from the study point to specific issues that engineering ITAs face. These insights will help in creating resources for incoming and continuing ITAs to help them more effectively navigate their experiences.

Second, this study identifies the existing practices used by ITAs and support structures provided to them by the universities and engineering departments that are helping them become better teachers. In particular, some ITAs in this study noted relying heavily on the course instructors and fellow teaching assistants to prepare for the course, understand sociocultural differences in teaching and learning, and manage their teaching workload. Additionally, some also found the GTA trainings in the beginning of the semester very helpful in understanding their roles, and learning strategies to navigate their teaching experiences. These practices can be further supported by institutions to help ITAs teach effectively.

At the same time, the findings highlight areas in which university and department administrators need to better address the needs of ITAs so that they are empowered to grow as future academics. For instance, workshops can be organized to help ITAs hone their

communication and workload management skills. Similarly, focused efforts can be made to help ITAs understand the diversity present in US classrooms and how ITAs can best support the needs of a diverse set of students in the class.

Third, besides helping ITAs grow as future academics, the findings also shed light on the ways universities can leverage ITAs' pedagogical skills and the cultural experiences they bring to an undergraduate classroom. For example, efforts can be made to create an academic environment that values the cultural and linguistic skills brought by ITAs to US classrooms so that ITAs feel comfortable to use their knowledge of diverse ways of communication and different English dialects as tools to teach global competence to undergraduate students. Also, ITAs can be encouraged to use their knowledge of different ways of teaching and practicing engineering learned in their home countries to better support student learning. Encouraging ITAs to leverage their existing knowledge of teaching and practicing engineering will also lead to a rich and diverse learning experience for the undergraduate students taught by ITAs, and further help students improve their intercultural competence. Similarly, universities should encourage the undergraduate students to engage with ITAs so that students can develop intercultural competence along with learning the course content. Given the increasingly diverse nature of the engineering workforce, there is a growing need for the development of global competence in engineering graduates (Johri & Jesiek, 2014).

1.5 Chapter overview

This chapter provided a brief overview of my study by establishing the context and need, discussing my motivations, explicating the research questions along with the research design, and finally highlighting the significance of the study. ITAs are important to the US academic system because of their contributions to undergraduate instruction and the diversification of college campuses. This study uses a multiple-case study approach to explore the experiences of ITAs in engineering, how ITAs navigate these experiences, and how their social identities shape these experiences.

Chapter 2 of this dissertation provides a detailed discussion of prior work on international teaching assistants, identifies gaps in the current literature, and discusses intersectionality, which forms the theoretical framework for this study. I start Chapter 2 by providing a description of

Hofstede's (2001) cultural dimensions and differences in educational cultures based on those dimensions, and situating Hofstede's work in my study. After that, I discuss findings from prior research on the challenges and rewards experienced by ITAs, how they navigate their experiences, and how ITAs are perceived by students and administration in the academic system. Then I discuss key gaps in the prior literature on ITAs that highlight the need for this study. Finally, I introduce and discuss the intersectionality framework that is used to conduct this study, along with a rationale for using the framework.

Chapter 3 presents an overview of the research methods used. I start this chapter with a discussion of my worldview and justification for using the multiple-case study methodology for this study. After that, I discuss how I recruited, selected, and retained the participants for my study. Finally, I elaborate on how I collected and analyzed data for the study, and the steps I took to enhance trustworthiness and transferability of the findings to other contexts.

Chapter 4 reports the results of the data analysis for this multiple-case study. In this chapter, I present the salient themes that emerged from the data to describe ITAs' teaching experiences, navigational strategies, and the influence of their social identities on their teaching experiences. Then, I discuss the results of the cross-case analysis performed on the data to explore similarities and contrasts across ITAs' experiences and the factors that might have influenced these experiences.

Chapter 5 provides a discussion of the results from an intersectional lens, contributions to the literature on ITAs, implications for engineering education practice, and directions for future work. I start this chapter by summarizing the findings in light of the prior literature on ITAs, and highlighting the contribution my research makes to the existing body of knowledge by expanding our understanding of engineering ITAs' experiences and navigational strategies. Then, I situate the findings from this study within the conceptual framework of intersectionality, and use this framework to highlight the issues of power and privilege ITAs face in the US academy. After that, I elaborate on the implications that the research findings have for universities, engineering departments, faculty, and ITAs that address the power differential that ITAs experience and help ITAs use their privileges to better support student learning. Finally, I note some future avenues for research that build on this study to help us gain a deeper understanding of ITAs' experiences.

Chapter 2: Literature Review and Theoretical Framework

International teaching assistants cross national and cultural boundaries when they come to the US, and what is considered effective teaching varies across cultures (LeGros & Faez, 2012). Thus, ITAs have to navigate cross-cultural issues in teaching in addition to differences in language. As ITAs grapple with linguistic and cultural differences, they face both challenges and rewards from teaching in an academic culture different from their native one. In this chapter, I situate my research by discussing differences in academic cultures across countries using Hofstede's (2001) cultural dimensions. After that, I elaborate on the challenges and rewards faced by ITAs while working in the US academy. I then discuss how ITAs navigate their experiences of teaching in the US. Then, I elaborate on how ITAs are perceived by students and faculty at US universities. While discussing the literature on ITAs, I also highlight the gaps present in the literature. After that, I elaborate on the need for my research and how this study bridges the gaps present in the literature. And finally, I discuss intersectionality, the theoretical framework guiding my study.

2.1 Educational cultures based on Hofstede's cultural dimensions

One way to understand culture is as a lens through which a group of people perceive, experience, and understand the world (Klein, 2004). It shapes their values and guides their actions and behaviors. As Hofstede (2001) argues, culture is “*the collective programming of the mind that distinguishes the members of one group or category of people from another*” (p. 9, italics in original). As a result, scholars use cultural categories to understand and explain a given group's values and behaviors, as well as to understand how people's values and behaviors vary across nations or other boundaries.

However, there are many complexities in analyzing, categorizing, and comparing cultures. First, there is a lack of consensus among scholars about the definition of culture. As Murzi (2016) notes, some scholars “measure culture as learned behaviors, others as abstractions from behaviors, and still others measure culture as the relation between selected objects and their meanings to people” (p. 34). Second, there are individual differences among the members of the same culture. These differences are more prominent in the current era of globalization in which people routinely move across cultures. Hence, it is possible that someone from India is culturally

more similar to someone from Western Europe than someone from their own country. Third, culture changes over time and the categorization done in a particular time period might not be apt in the future (Gillespie, Howarth, & Cornish, 2012).

Despite these complexities, cultural categories can still yield insights into behaviors and values of people at a given point of time. As discussed in Chapter 1, Hofstede's (2001) theory of cultural dimensions helped illuminate some of my teaching experiences in the US. His work helped frame how academic cultures vary across the globe and hence illuminated the influence of ITAs' cultural backgrounds on their teaching experiences (See *Cultural challenges* in Section 2.2.1). His work motivated me to understand the experiences of international teaching assistants who cross national boundaries to come to the US and teach engineering classes at US universities. To that end, I draw on Hofstede's cultural dimensions to frame the kinds of differences ITAs from various cultures may experience in the US.

Hofstede (2001) developed his theory of cultural dimensions to study national cultures around the world in the context of business. In the initial study, he used a paper-and-pencil survey to understand cultural differences among employees of IBM in 40 different countries. He then conducted correlation and factor analyses of the survey responses using employees' countries as the criterion. Based on these analyses, he identified four dimensions of national cultures - power distance, uncertainty avoidance, individualism, and masculinity. Power distance refers to the degree to which less powerful people in a society accept an unequal distribution of power and consider it as normal. Uncertainty avoidance is defined as the extent to which people within a culture are uncomfortable with what they perceive to be ambiguous, unstructured, and uncertain. Individualism refers to how individuals in a society see themselves in relation to a group. An individualistic society is loosely integrated and a person primarily looks after their own interests in such societies, whereas a collectivist society is tightly integrated and its members look after the interests of other members. Masculinity refers to the degree to which men and women differ in terms of roles and values associated with them due to the differences in their biological sexes. In societies with high level of masculinity, men are expected "to be assertive, ambitious, and competitive" (Hofstede, 1986, p. 308), and strive for material goals and successes, whereas women are expected "to care for the non-material quality of life" (p. 308).

However, in societies with lower masculinity, both women and men are relatively less ambitious and value non-material quality of life.

Hofstede further applied the findings from his initial studies to predict differences in academic cultures across different nations. In his book *Culture's consequences: Comparing values, behaviors, institutions, and organizations across nations* (2010), Hofstede discusses the ways in which not only business but educational cultures vary across nations based on the four dimensions, and other scholars have since taken up this work. For example, this framework was used by Murzi (2016) to understand the differences in academic cultures in engineering, marketing, and industrial design. Similarly, studies by Roach and Byrne (2001) and Roach, Cornett-Devito and Devito (2005) have used the power distance dimension to understand differences in instructor communication patterns in US, German, and French classrooms. Table 2-1 summarizes the differences Hofstede identified in educational approaches based on his four cultural dimensions. It should be noted that the attributes listed in the table present two ends of the spectrum (high and low), while in practice most academic cultures lie somewhere in the middle of the spectrum.

Hofstede notes that in societies with high power distance, education is teacher-centric and there is value in student dependence on and respect for the teacher as the authority figure. Teachers rely on personal wisdom and stories to impart knowledge to students, and teaching excellence is directly connected with student learning. On the other hand, teaching is student-centric in low power distance educational cultures. Student independence and initiative are emphasized and valued, and there is a more equal relationship between teachers and students (Hofstede, 2001; Roach et al., 2005).

In terms of uncertainty avoidance, educational cultures that are higher on the scale of uncertainty avoidance regard structure as valuable in the teaching process. Teachers are considered to be experts. These cultures are characterized by specific learning objectives and students are rewarded for accurate solutions. Academic cultures that have lower levels of uncertainty avoidance view 'truth' as relative and prefer a lack of structure. Learning is open-ended and distinguished by a broad set of learning objectives and assignments. Teachers accept a broad range of answers from students and prefer originality in answers (Hofstede, 2001; Roach et al., 2005).

Table 2-1: Differences in educational cultures adapted from Hofstede

Cultural Dimension: Power Distance (Hofstede, 2001, p. 107)	
<i>Low power distance</i>	<i>High power distance</i>
Student and teachers treat each other as equals.	Students see teachers as authority and treat them with respect.
Student-centered education.	Teacher-centered education.
Teachers transfer impersonal truths.	Teachers transfer personal wisdom.
Quality of learning dependent on students' excellence and two-way communication.	Quality of learning dependent on excellence of teachers.
Cultural Dimension: Uncertainty Avoidance (Hofstede, 2001, p. 169)	
<i>Low uncertainty avoidance</i>	<i>High uncertainty avoidance</i>
Open-ended learning situations with originality preferred.	Structured learning situations with emphasis on seeking right answers.
Teachers might not know all answers.	Teachers expected to know all answers.
Truth is seen as relative.	Truth is seen as absolute.
Student achievement seen as a function of one's ability.	Student achievement attributed to efforts, context, and luck.
Cultural Dimension: Individualism (Hofstede, 2001, p. 237)	
<i>Low individualism</i>	<i>High individualism</i>
Teachers work with students as a group.	Teachers work with students individually.
Individual initiatives by students not valued.	Individual initiatives by students encouraged.
Harmony and saving face in class.	Student selves are respected.
Aggressive behavior discouraged.	Students' self-esteem considered good.
Education aimed at learning "how to do."	Education aimed at learning "how to learn."
Diplomas lead to acceptance in a higher-status group.	Diploma provide increased economic worth and self-respect.
Cultural Dimension: Masculinity (Hofstede, 2001, p. 306)	
<i>Low masculinity</i>	<i>High masculinity</i>
Friendliness in teachers appreciated.	Brilliance in teachers valued.
Weak students encouraged by praising openly.	Good students rewarded by praising openly.
Most students expected to be average.	Most students expected to be the best.
Social adaptation is encouraged.	Competition is encouraged.
Own performance underrated.	Own performance overrated.
Girls and boys receive equal attention.	Boys receive more attention.
Study subjects are not gendered.	Study subjects are gendered.

Hofstede's third dimension of national cultures is individualism. In the educational context, in highly individualistic societies teachers work with students individually and encourage individual initiatives. In societies with collectivism, teachers work with students as a group and encourage group work. On the other hand, in cultures with high individualism, students' individual selves are respected and value is given to students' self-esteem. Educational cultures with collectivism discourage aggressive behavior in class while encouraging harmony

among students. Education in individualistic societies is aimed to prepare students for their individual positions a society that is made up of other individuals, and academic credentials provide a sense of worth and achievement. On the other hand, in collectivist societies, education offers one means to learn skills, qualities, and values that are needed for acceptance in the society, and academic credentials afford the bearer the privilege to associate with higher-status members of the society (Hofstede, 2001; Roach et al., 2005).

In terms of masculinity, educational cultures that are masculine stress competition among students, while feminine cultures stress social adaptation and avoidance of aggressive behavior. In masculine cultures, teachers praise high-achieving students more openly and encourage them to be the best. On the other hand, public praise is done to encourage weak students in feminine cultures and the average student is considered the norm. Also, cultures with low masculinity value gender equality more than the ones with high masculinity. In these cultures, equal attention is given to both girls and boys, and there is little difference in their perceived abilities. Also, girls and boys study the same subject in cultures with low masculinity (Hofstede, 2001; Roach et al., 2005).

Hofstede's cultural dimensions thus illuminate potential differences ITAs may experience related to the role of the teacher, the expectations of students, specific pedagogical approaches to assignments and grading, ways of leading class meetings, and more. Thus, these cultural dimensions provide an overarching framework to understand how ITAs' cultural backgrounds influence their experiences of teaching undergraduate engineering classes at US universities.

2.2 Experiences of ITAs

While Hofstede's cultural dimensions offer a broad characterization of potential variations in educational approaches, they do not directly address the experiences of ITAs who are in the process of crossing national and cultural boundaries. When ITAs cross national boundaries to pursue their graduate education at US universities, they may find significant differences in the academic cultures present at US universities and those in their home countries. Working in an academic environment that is culturally different simultaneously poses multiple challenges and offers several opportunities for growth for ITAs. In the following sub-sections, I discuss the challenges and rewards of the ITA experience identified by previous researchers.

2.2.1 Challenges faced by ITAs

As work by Hofstede and others suggest, ITAs are likely to encounter cultural differences in teaching and learning when they come to the US. At the same time, they often also have to navigate linguistic differences. This is particularly true for ITAs from Asian countries such as China, India, South Korea, and Taiwan where English is not their first language, and they learn English at a later stage in their lives. Notably, these students make up the majority of ITAs in the US (Institute of International Education, 2016). These cultural and linguistic differences manifest as multiple challenges that ITAs face while teaching in US classrooms. To help describe these challenges, Kuo (2002) groups them into four categories: linguistic, cultural, instructional, and classroom management. The following sub-sections discuss these challenges in detail. It should be noted that while this research focuses on these challenges in the context of ITAs, many are relevant to domestic teaching assistants as well. For example, a domestic teaching assistant who has no prior teaching experience may not be aware of their roles and expectations, which may lead to instructional challenges for them. They may also face challenges because of student behavior that disrupts the flow of the class and seems disrespectful to them (Luo et al., 2000), or because their pronunciations and regional accents differ from those of their undergraduate students.

2.2.1.1 Linguistic challenges

The first category of challenge Kuo describes is linguistic. As noted earlier, most ITAs do not have English as their first language. Although ITAs who are nonnative speakers of English are required to take the TOEFL test (or SPEAK test) and achieve a certain score to be eligible to teach at many US universities, Yule and Hoffman (1990) argue that a high TOEFL test score does not guarantee that an ITA will be able to effectively present instructional material in spoken English. Clayton (2000) notes several instances in which undergraduate students complain about difficulties in understanding the speech of ITAs in a variety of courses. If an ITA has a strong accent or their command of English is not very strong, lack of comprehension by and miscommunication with undergraduate students may result (Lin & Yi, 1997). As a result, Bauer (1996) notes that many ITAs who are nonnative speakers of English are concerned about their language usage in classrooms. They are afraid that students might misunderstand them. Often, ITAs might feel frustrated or lose confidence as a communicator and a teacher due to the

“language barrier” (Ross & Krider, 1992). Despite increasing globalization, these barriers still persist today. In a recent study by Arshavskaya (2015), all ITAs expressed challenges in fully understanding the undergraduate students they taught. Similarly, in a study by Wang (2016), several ITAs thought of themselves as less competent than their domestic counterparts mostly because of their non-native-English-speaking status.

Such communication issues arise not only when ITAs engage in oral communication with students, but also in their work with written communication, assignments, and feedback. Lax (2002) notes that many ITAs have English as their second language and hence speak English that might not follow standard academic English. At times, they also may be unaware of the appropriate conventions for word choice, tense, or word order (Bauer, 1996). In such cases, they might not be the best evaluators of undergraduate students’ writing. In her experience of working with ITAs, Bauer (1996) noted that several ITAs said they were reluctant to grade students’ written work as they did not feel confident enough to do so given their non-native English speaker status.

2.2.1.2 Cultural challenges

The second set of challenges Kuo identifies focuses on cultural issues. These issues can take several forms and often link to Hofstede’s cultural dimensions. The first area of cultural differences concerns the relationship between teachers and students. For example, many ITAs come from educational backgrounds characterized by high power distance, with minimal interaction between students and teachers in the classroom. Students are expected to carefully listen to their teachers and take notes. In the US, ITAs may find themselves in classroom settings that have fewer students, and classes are expected to be interactive (Bauer, 1996). This expectation has increased in recent years with more emphasis given to active learning, particularly in STEM disciplines (Lord & Chen, 2014; Prince & Felder, 2006). Similarly, in many cultures it is considered impolite, and even insulting, to interrupt a lecture to ask questions of professors (Balas, 2000). ITAs who come from such cultures may feel uncomfortable or offended if students ask them a question in the classroom as they might not be used to such instructional style in their home countries (Bresnahan & Cai, 2000). For example, some ITAs in Bresnahan and Cai’s (2000) study noted that they felt uncomfortable when they were asked by their professors to refer to them by their first names. While ITAs from many educational cultures

are used to a more formal student-teacher relationship, some ITAs in this study also noted the personal warmth they felt for their teachers in their home countries, possibly due to a more collectivist culture present in those countries. On the other hand, they felt that teachers in the US did not know students outside the classroom. Similarly, Arshavskaya (2015) found that there are different rules with regards to physical contact between teachers and students in different countries. For example, one of the ITAs in her study noted that teachers could touch students in their home country but not in the US. Such cultural differences may lead to ITAs misinterpreting students' behavior and vice versa in classrooms.

The second area of cultural differences involves the knowledge of students' academic level. As ITAs have not done K-12 schooling in the US, they might not be aware of the academic preparation and knowledge that US undergraduate students have at different stages of education (Arshavskaya, 2015), and hence, might be ill-prepared to provide adequate support to the undergraduate students. This issue might be exacerbated by that fact that some of the ITAs reported finding that "U.S. students were less academically prepared than the same level students in the ITAs' home countries" (Arshavskaya, 2015, p. 61), which may dissuade them from putting in the required effort to make their teaching useful for the students.

The third area of cultural differences relates to differences in writing styles across cultures, which translate into challenges for ITAs in evaluating written work by undergraduate students and giving them feedback. Many Asian cultures, for example, differ in reader-versus-writer responsibility for understanding the meaning of the text, placing more responsibility on the reader for understanding a piece of writing. Moreover, in some countries, lack of organization in lab reports is ignored as long as students get the correct final answer. On the other hand, structure and organization are important aspects of lab reports in the US, and some sections are prescribed to be present in a lab report in a particular order (Lax, 2002). Another issue related to written work concerns academic plagiarism and dishonesty. Different academic cultures treat texts copied from other sources differently. For example, in a study conducted by Hayes and Inrona (2005) with students in two postgraduate management programs, the authors found that Asian students did not consider copying a few sentences word for word as academic dishonesty. Similarly, extensive collaboration on assignments is an accepted practice in many collectivist countries, which may lead to an ITA committing mistakes in terms of neglecting

cases of cheating or plagiarism while grading written reports and giving feedback to students (Lax, 2002).

The final area of cultural differences involves diversity. A typical US college classroom includes students of diverse race, gender, social class, age, and ability. But Zhou (2009) notes that many ITAs may not be aware of the diversity as it is reflected in American society and the education system, as they might be coming from a relatively homogeneous culture. As a result, they might be unaware of the existence of and the ways to address racism, sexism, homophobia, and other forms of discrimination and power as they play out in US classrooms. A lack of knowledge of such complexities might hinder ITAs in meeting the needs and expectations of all students in the classroom.

2.2.1.3 Instructional challenges

The third set of challenges relate to carrying out instructional duties. These challenges may arise due to their lack of knowledge of their roles and responsibilities, and lack of familiarity and comfort with testing and grading systems. The TA role is a unique characteristic of the US educational system and international TAs may not be aware of what that role entails because they might not have encountered a TA during their prior educational experiences. As a result, they may not be able to provide adequate support to the students they instruct (Bauer, 1996). Regarding assessing students' learning, many ITAs in Trebing's (2007) study, for example, noted that they were unfamiliar with a system of student assessment that relied on regular assignments and tests throughout the semester. They were used to a grading system that used a cumulative test at the end of the academic term.

2.2.1.4 Classroom management challenges

The final set of challenges identified by Kuo relates to challenges in managing student behavior in the classroom. Teaching assistants (both international and domestic) often complain about students' behavior in the classroom. For example, ITAs in Bresnahan and Cai's (2000) study were unpleasantly surprised by some of the behaviors shown by American undergraduate students such as "late arrivals, early departures, draping feet over chair backs, listening to music, eating and drinking during class, making excuses for late assignments, kissing in class, challenging the instructor, use of profanity, etc." (p. 68). Similar complaints were noted by the

participants in Trebing's (2007) study that explored the experiences of ITAs toward teaching in US and their perceptions of US undergraduate students. Besides complaints about student behavior in the classroom, ITAs in Arshavskaya's (2015) study also noted that many of the students they taught came unprepared to the class, would not pay attention during class meetings, would not take notes from the board, and would not clean up after lab work was complete. Some of the participants in her study also complained about the disrespectful language used by undergraduate students for the ITAs. Such behaviors by students not only disrupted the flow of the class, but also increased ITAs' workload in teaching and managing the class.

Complicating this situation, some studies suggest that undergraduates sometimes intentionally create classroom management issues with ITAs. Gravois (2005) notes that American students generally refuse to listen to ITAs if they have a foreign accent. Regardless of whether an ITA presents the course material appropriately or not, they are not given due respect in the classroom. In her study to understand the acculturation processes of ITAs at a US university, Mascoop (1993) found that undergraduate students at times purposefully initiated miscommunication with ITAs and showed disrespect by using slang, mimicking ITAs' pronunciation, and violating their classroom guidelines.

2.2.2 Rewards of the ITA experience

While the above sections discuss various challenges faced by ITAs, the experience of being an ITA can also lead to productive learning in terms of both enhanced pedagogical practices and cultural enrichment. For example, participants in the study conducted by Trebing (2007) to understand the experiences of ITAs noted generally positive feelings toward US college classrooms. They found the classrooms to be more interactive, which helped facilitate learning. They "enjoyed the friendly atmosphere in which participation is encouraged, all opinions are accepted" (p. 85). The participants noted that employing student-centric methods such as adapting teaching to real life situations, group work, classroom discussions, and using student feedback helped them improve their teaching. The extensive use of technology was also seen as something that made teaching easier for ITAs as it helped them organize their teaching (Arshavskaya, 2015).

Besides learning a diverse set of pedagogical tools, ITAs and international instructors also learn to become more inclusive teachers through exposure to diverse viewpoints about teaching and learning and through engaging in the process of cultural adjustment (Trebing, 2007). Zong (2011), for example, describes how as an international graduate student and instructor, she got the opportunity to interact with students from various ethnic and cultural backgrounds, and discuss and debate issues including “race and racism, population policy, environmental pollution, power, the Cold War, the emerging globalization, and the implications of all these factors for education policies and practice” (p. 30). She further notes that these experiences motivate her to make global and cross-cultural experiences an important aspect of her teaching and research. Similarly, Smith (2011) notes that her international education and experiences of being a foreign teacher empowered her to question and critique the dominant narratives and helped her become fully aware of the connections between her cultural roots and cross-cultural experiences.

2.2.3 Summarizing ITAs’ experiences of challenges and opportunities

As discussed in the previous sections, ITAs experience both challenges and rewards from teaching at US universities. As ITAs transcend national boundaries and teach in academic cultures different from their native ones, they face challenges in terms of adjusting to linguistic and cultural differences, meeting their instructional duties, and managing student behavior while in the classroom. At the same time, while working in a different academic culture, they also learn diverse pedagogical skills and cultural perspectives to analyze social problems and new ways of bringing about positive change. Summarizing the rewards and challenges of being a Chinese instructor at a US university, Zong (2011) notes:

Many Asian women faculty members serving American universities have to go the extra mile to make up their cultural and linguistic differences to construct their professional niche and win support from colleagues and students. Many feel isolated, lonely, unsupported. Some experience rejection, exclusion, and stereotype. In my own experience, I have traveled the same path of most women immigrant faculty from East Asia. I have struggled long and hard to find my footing and to carve a place for myself in the profession. I have adjusted my thinking style, writing style, and teaching style. Over the years, while I developed critical perspectives to analyze social problems as a scholar, I also formed a constructive outlook on how we should work together to facilitate positive changes through communication and collaboration. (p. 35)

While Zong writes from the position of a faculty member, her experiences extend to many internationals, including ITAs, working in the US. As ITAs are in the process of crossing national and cultural boundaries, they may experience stereotype, isolation, and lack of support. They may also have to modify their teaching styles and thought processes to meet the needs of their students and establish themselves as effective teachers and scholars in their new academic cultures. But this experience of teaching in a different academic culture contributes to their personal and professional development by helping them develop critical perspectives, and cross-cultural communication and collaboration skills.

2.3 Navigating the ITA experience

2.3.1 Navigational strategies

While much of the research on ITAs has focused on challenges and benefits, as noted above, another key strand of work explores how ITAs navigate their experiences. The results suggest that, to navigate their experiences, they employ a variety of strategies such as modifying pedagogical practices, seeking support, engaging with students, improving linguistic skills, and undergoing changes to identity. These strategies are discussed in detail in the following paragraphs.

One critical navigational strategy focuses on modifying teaching practices. As instructional instructors and ITAs navigate through the challenges and benefits of teaching as a foreign instructor, they undergo transformations in their beliefs about teaching and modify their pedagogical strategies in order to become more effective teachers. For example, in their autobiographical account, Lepadatu et al. (2011) note how as Romanian faculty members, working at a US university, they had to make adjustments to their teaching and learn different skills. They write:

We have had to go beyond seeking academic competence to becoming skilled psychologists, pedagogues and diplomats. We had to learn how to instill critical thinking skills without instilling hurt at the same time; we had to learn how to accommodate diversity by integrating the myriad of world views that co-exist in such a society; and finally, we had to monitor our own acculturation process by paying attention to the pitfalls of wanting to belong, too quickly or at any cost. (p. 77)

Similarly, ITAs in the study conducted by Little (2016) noted modifying their teaching strategies and adopting practices such as stressing difficult concepts and drawing student attention to important ones, identifying and explaining common mistakes, and helping students make connection between concepts to support their learning.

In addition to modifying pedagogical strategies on their own to better suit the needs of students, ITAs also seek support from fellow faculty members and graduate students to overcome the challenges they encounter while teaching. In a study to explore factors leading to success of ITAs, Bresnahan and Cai (2000) found that ITAs who successfully adjusted to teaching in a new academic environment reached out to the course director or another faculty member or a fellow graduate student when they encountered a problem in teaching. Some even sought the help of their students to address the problem.

A third strategy often employed by international instructors is engaging and building rapport with students. For example, in her autoethnographical reflections, Hebbani notes how she built rapport with her students by referring to the examples used by her students and showing her knowledge of American football. Additionally, she ensured that she was well-prepared for her classes, posted grades in a timely manner, and allotted times before and after class to meet with students (Hebbani & Hendrix, 2014). Hsu (2014) recommends having an openness to students' ideas and critiques, coupled with a willingness to work out problems as other ways of building rapport with students. Similarly, Chen (2014) notes maintaining a classroom atmosphere that allows her students to engage with her and her TA on challenging intercultural topics in a large intercultural communication course. Mutua (2014) uses the strategy of engaging students in a dialogue to navigate some of the issues of speaking English with a different accent. She notes:

I address this from the very first day of class. I introduce myself and where I am from. I then note that my accent is Kenyan and it may take a bit of time to get used to it if they have never heard it before. I then joke that my English is very British and get them to tell me some of the words that are different in American and British English. This usually introduces some levity to the discussion and gets most students engaged, and drives the point home that English has different dialects. (p. 55)

The way she handles the difference in her accent not only engages students but also teaches students about different ways of speaking and using English. Other ways of building rapport and engaging with students, as noted by Zhang (2014), include complementing students' efforts,

exhibiting openness and addressing students' curiosity about foreign culture, leading by example to enforce course policies, and exhibiting subject knowledge.

Fourth, apart from engaging with students in a dialogue about language, some international instructors also work on improving their own linguistic skills. Hebbani notes that she started taping their speeches and listening to them in her spare time to be more comfortable with her students' accents (Hebbani & Hendrix, 2014). On the other hand, Hsu (2014) underwent an accent modification treatment to change her accent in such a way that it is easy to understand for her students.

Finally, as part of navigating their new academic cultures, international instructors also undergo changes in their social identities. For example, Chen (2014) notes that she found herself “constantly negotiating feeling re(realized) in moments of discussing race and awkwardly questioning” (p. 10) what her “Asian-ness” meant while working as an international instructor at a predominantly White US university. While teaching intercultural communication at the university, she found her racial identity became very salient when she employed examples of US-based race relations. As she chose, discussed, and unpacked those examples, she became more and more aware of her own identities. She experienced herself “not just as Asian, but also as an Asian immigrant, a heterosexual East Asian, an Asian/Taiwanese woman, and so on” (p. 12). She also used blogging as a tool to reflect on the emotional climate of the class and her own emotional response to her racialization in the class.

2.3.2 Lack of systematic studies on ITAs' navigational strategies

While the literature discussed above highlights a range of navigational strategies used by international faculty and teaching assistants, it relies predominantly on the autobiographical accounts of international scholars narrating their experiences (Chen, 2014; Hebbani & Hendrix, 2014; Hsu, 2014; Lepadatu et al., 2011; Mutua, 2014; Zhang, 2014). Consequently, there remains a lack of a systematic study employing established theoretical and methodological frameworks to understand how ITAs navigate their experiences. Atkinson and Delamont (2006) argue that individual narratives or stories do not give us complete truths. Rather, what they give access to is the interpretation of the experiences of those individuals. At the same time, narratives are embedded in the organizational context of the narrator. Hence, the

autobiographical accounts of international instructors do not give us a complete understanding of how they navigate their experiences of teaching US classrooms. Therefore, systematic study is required to get a deeper understanding of how multiple ITAs and international instructors navigate their experiences.

My research reduces the above-mentioned gap in the literature by systematically studying how ITAs navigate their teaching experiences, using intersectionality as the theoretical framework (see Section 2.5) and case study as the methodological framework (see Chapter 3). Intersectionality accounts for the various contextual and social factors that come into play to shape engineering ITAs' experiences. Also, for this study, the participant pool represented variations in ITAs' characteristics by sampling them across nationality, gender, prior GTA experience with the same course, and level of class taught, thus making the results relevant for ITAs in a large number of US universities. The findings of my research (see Chapter 4) highlight practices that engineering ITAs find beneficial for navigation of teaching experiences and their professional development. These practices, as identified by ITAs, can be supported by the academic institutions to help ITAs teach effectively.

2.4 Lack of focus on ITAs in engineering

While prior research on ITAs has captured the experiences of ITAs, highlighting both the rewards and challenges, it tends to look at ITAs' experiences and navigational strategies across the university as a whole and does not generally take disciplinary differences into account. But a range of studies suggest that there are disciplinary differences in teaching and learning in higher education (e.g., Becher, 1989; Biglan, 1973; Braxton, 1995; Donald, 2002; Stark, 1998), and ITAs teach in many different disciplinary contexts. For example, Biglan (1973) classifies academic disciplines across three dimensions: pure-applied, life-nonlife, and hard-soft. Pure disciplines are the ones that focus on abstract theorization as compared to the applied ones that focus on solving practical problems. Finally, disciplines on the life-nonlife disciplines vary in terms of their focus on animate or inanimate objects (Biglan, 1973). Hard disciplines are the ones in which there is consensus over the paradigms underlying the discipline, which leads to consensus over content to be taught and teaching methods. On the other hand, soft disciplines lack a well-defined paradigm, and hence content to be taught, and teaching methods in these disciplines are based on the idiosyncrasies of the teacher. Braxton (1995) notes that faculty in

hard disciplines focus on application of course material and using research experience as a pedagogical strategy. On the other hand, faculty in soft disciplines are more inclined to developing oral and written communication skills and critical reading and thinking skills. Moreover, they also tend to adopt student-centric and active learning approaches.

Following Biglan, Becher (1989) classifies academic disciplines on four dimensions – hard-soft, pure-applied, convergent – divergent (based on the degree of convergence in parent disciplines), and urban – rural (based on the ratio of researchers to research problems with urban disciplines having a higher ratio of researchers to research problems). He argues that academic disciplines can be seen as tribes, each characterized by their own set of intellectual values and cognitive territory. These intellectual values and cognitive domains give rise to a specific disciplinary culture, which in turn shapes the behavior of individuals in the disciplines. For example, people are more competitive and task-oriented in hard-pure disciplines, individualistic and person-oriented in soft-pure disciplines, entrepreneurial and role-oriented in hard-applied disciplines, and outward-looking and power oriented in soft-applied disciplines (Becher, 1987). Similarly, researchers in an urban discipline engage in research questions that yield quick solutions while those in a rural discipline pursue research that may take years to yield results (Becher, 1989).

Building on these studies, other scholars (e.g., Donald, 2002; Stark, 1998) argue that there are disciplinary differences in the nature and structure of knowledge. These differences give rise to differences in teaching and learning, and assessment of students' learning in various academic disciplines. Engineering, given its roots in high consensus disciplines such as physics, chemistry, and mathematics, and its orientation toward solving practical problems, is classified as a hard-applied discipline (Biglan, 1973; Stark, 1998). Not surprisingly then, Donald (2002) notes while most engineering instructors view problem-solving skills to be necessary given the applied nature of engineering, they prefer a lecture-based approach to teaching over active learning methods, as is characteristic of a hard discipline. This tendency is further supported by the study conducted by Murzi (2016) to understand students' perceptions of disciplinary differences. In this study, the author found that teacher-centric ways such as lecture are preferred over active learning in particular disciplines of engineering. Also, engineering students preferred

developing technical skills over professional skills, and valued solving problems through the application of prior course material rather than through creativity and innovation.

As such studies suggest, ITAs' experiences and navigational strategies from diverse academic disciplines may not hold true for engineering. Students in different disciplines may have different expectations of their instructors and teaching assistants. These differences in expectations may lead to differences in teaching experiences for faculty and TAs (including ITAs). At the same time, the way ITAs navigate their experiences may differ by disciplinary context. As teacher-centric and lecture-based teaching is preferred over discussion-based active learning methods in engineering, ITAs in engineering may have to adopt different kinds of teaching strategies than those in other disciplines. As a result, they may face different kinds of issues in teaching and managing their classes. Supporting this possibility, in a study to understand the classroom management issues faced by teaching assistants of all nationalities, Luo et al. (2000) found that TAs in different disciplines reported different kinds of problems in managing their classes. Hence, there needs to be research that captures the experiences of ITAs at the discipline level. This study reduces this gap in the literature by focusing on the experiences of ITAs, and the navigational strategies adopted by them in engineering.

2.5 Negative student and faculty perception of ITAs

2.5.1 Perceptions of ITAs

The research described in the previous sections offers important insights into ITAs' experiences that lay the groundwork for a more discipline-specific and systematic research. However, prior studies also pose a key challenge for scholars in terms of the overall perception of ITAs. As ITAs navigate the challenges and rewards of teaching in a foreign culture, they add significant value to the US university system in terms of increasing the diversity on college campuses and bringing in diverse pedagogical skills. Also, as Yep (2014) argues, they possess diverse sets of knowledge, abilities, and contacts that they "utilize to survive and resist cultural normativities and to succeed and thrive in US classrooms" (p. 87).

However, instead of valuing the skills that ITAs possess and bring to US universities, they are often seen in a negative light by faculty and students alike. International instructors (including teaching assistants) are seen as lacking in knowledge and skills – social, cultural, and

linguistic – to teach a class (Yep, 2014). The research on undergraduate and faculty perceptions of or experiences with ITAs consistently casts ITAs in a negative light. Plakans (1997) notes that undergraduates who are taught by ITAs are sometimes put into a difficult situation when required courses are taught by “inexperienced TAs whose manner of speaking English and whose cultural and pedagogical expectations may be different from their own” (p. 112). Students in the study conducted by Fitch and Morgan (2003) complained about not being able to understand their ITAs. This sense of miscommunication was not only limited to non-Native-English-Speaking ITAs but also to those from places where English is a primary language (such as India or the Caribbean). In the latter case, the students would complain that the ITA did not speak “the right kind of English” (p. 303). In this study, the researchers found that a “culturally common tale in the university is that the ITA is a problematic character” (p. 306) and students see themselves as victims if they are taught by ITAs. Many students prefer to be taught by a domestic teaching assistant (Bresnahan & Kim, 1993).

This attitude of undergraduate students persists in spite of the fact that being taught by a foreign instructor does not necessarily have a direct impact on student learning (Clayton, 2000). In a study to compare the final exam scores of undergraduate students in different sections of math and business classes taught by both domestic and international teaching assistants, Jacobs and Friedman (1988) found that a TA’s national background had no significant impact on students’ final exam scores in any of the sections. These findings were also supported by Norris (1991) who analyzed the influence of non-native English-speaking TA on student grades in various courses and found that students performed slightly better in the sections taught by non-native English-speaking TAs.

ITAs and international instructors are perceived as deficient not only by students but also by faculty. In the study conducted by Jenkins (2000), it was found that the academic faculty associated ITAs with behaviors such as “lack of motivation, isolationism, and unwillingness to cooperate in ITA instructional assignments, or in improving their English” (p. 477). Talking about their experiences of being international and women faculty, Sachs, Clarke, Kinuthia, McGrail and Verma (2011) note that they consistently have to prove and re-prove themselves to not only the students but also their colleagues. Describing the presence of an academic

environment that assumes them to be incapable and inferior, they note that, at times, they have been asked by junior faculty for their credentials during discussions and meetings.

Moreover, the “ITA problem” has not only been a theme in the universities. It has gained the attention of legislators as well. As reported in *The Chronicle of Higher Education*, North Dakota State Representative Bette Grande proposed a bill in 2005 that would have allowed a student to "withdraw from the class with no academic or financial penalty" (Gravois, 2005, 4th paragraph) if the student filed a written complaint about their inability to understand the instructor. Further, if 10% of a class filed similar complaint, the university would have to transfer the instructor to a non-teaching job. Ms. Grande’s aim was to move the university system to address students’ difficulties in understanding "what the heck their foreign-born instructors are saying" (3rd paragraph).

2.5.2 Lack of critical perspective in research on ITAs

Given that ITAs are often seen in a negative light by students, faculty, and universities as a whole, the aim of many studies is to offer suggestions for designing training curricula for ITAs that can help them “fit” into the contemporary US classroom and meet the expectations of undergraduate students and university administrators (Zhou, 2009). For instance, Arshavskaya (2015) studied the challenges faced by ITAs and identified steps that can be taken to better prepare the incoming ITAs. Similarly, Williams and Case (2016) explored how ITAs viewed the departmental mentoring strategies, and based on their findings provide general recommendations to departments for effective mentoring of ITAs.

However, much of the training designed to help ITAs overcome the challenges they face is ethnocentric in nature in that it tries to Americanize the ITAs (Pae, 2001). Briggs and Plough (*as cited in* LoCastro & Tapper, 2006) note that ITA training programs at their institution have been accused of promoting acculturation of ITAs to US pedagogical norms instead of valuing the diverse perspectives on teaching and learning they bring to US classrooms. They also argue that the testing and evaluation of ITAs at their university places more stringent requirements on ITAs in comparison to teaching assistants who are native English speakers. Similarly, Zhou (2009) notes that the ITA training programs adopt a very top-down approach, with little input from ITAs about their diverse developmental needs. Finally, ITA linguistic competence development

programs typically focus on Americanizing ITAs accents instead of valuing the World English perspectives that they bring.

Thus, the current university system devalues the pedagogical skills and cultural experience that ITAs bring to US classrooms. It places the burden of adjustment in cross-cultural learning situations on teachers or ITAs. In conclusion, it can be said that much of the research on ITAs does not take a critical perspective on their experiences. As Santini, Smith and Robbins (2011) note:

Touted as a positive value, the internationalization of higher education is, we would argue, inadequately critiqued, particularly around its impact on those members of the academic community who are most personally involved in effecting the ‘globalization’ of US classrooms – the ‘others’ who come from abroad to seek careers in the American academy. (p. xxii)

My research reduces this gap in literature by taking a critical stance on ITAs’ experiences and highlighting how their social and cultural identities shape their experiences at US universities.

2.6 This study and the guiding framework

As the previous sections explain, while prior research has explored the challenges and rewards of ITAs’ experiences and provided autobiographical accounts of how individuals navigate those challenges, this work generally lacks a broader critical framework that embraces the complexity of ITAs’ experiences to provide systematic accounts of both experiences and navigational strategies that consider nuances across disciplinary, cultural, and social identities. My research aims to reduce these gaps by using intersectionality to address the following questions:

RQ1: How do ITAs describe the experiences of teaching engineering classes at US universities?

RQ2: How do they navigate these experiences?

RQ3: How do ITAs’ social identities shape these experiences?

RQ4: What similarities and differences are present across the experiences of ITAs in engineering?

2.6.1 Intersectionality

To address these research questions, I have used intersectionality as the theoretical framework guiding my study. While Hofstede's theory of cultural dimensions offers a way to understand how ITAs' cultural backgrounds shape their experiences, it does not provide a critical stance that accounts for the differences in their experiences due to different social factors. Intersectionality offers a way to take into account differences among ITAs in ways that explicitly invite cultural and social critique. Intersectionality is an analytic framework grounded in feminist thought and experience-based epistemology that asserts that "people live multiple, layered identities and can simultaneously experience oppressions and privilege" (Dill, McLaughlin, & Nieves, 2007, p. 629). That is, it argues that people's life conditions and experiences are rarely shaped by a single factor such as race or class or gender or nationality. Instead, various social factors interact with one another leading to unique life experiences for people. Moreover, the different aspects of social life cannot be separated into individual components (Brah & Phoenix, 2004); in other words, an individual's experiences are not simply the sum of their experiences of gender, race, class, and other factors including status associated with academic rank or discipline. Instead, intersectionality argues that for any one person, those factors intersect in complex ways that vary by context. Hence, in order to understand their experiences, a framework that incorporates a variety of social factors is required. Intersectionality provides one such framework that incorporates multiple social factors and gives a complex picture of people's lived experiences (Collins & Bilge, 2016).

Intersectionality has its roots in the scholarly traditions of 19th and early 20th century scholars like Sojourner Truth, Maria Stewart, Anna Julia Cooper and W. E. B. Du Bois, who articulated the unique challenges faced by Black women due to their race, class, and gender (Dill et al., 2007). The term intersectionality was coined by legal scholar Kimberle Crenshaw (1989), who critiqued what she called the "single-axis framework that is dominant in antidiscrimination law and that is also reflected in feminist theory and antiracist politics" (p. 139). Discussing the discrimination faced by Black women, she argued that the existing feminist politics discriminated against Black women because of their race while anti-race politics ignored the Black women due to their gender. Hence, she advocated the importance of addressing the prejudices faced by Black women from an intersectional approach, that is, by looking at the ways

in which race and gender interacted to shape their experiences. Contemporary scholars such as hooks (1994), Hancock (2007), and Collins and Bilge (2016) have further advanced intersectional work through inclusion of an even wider array of social factors such as class, ethnicity, and sexuality to understand the lived experiences of people. These social factors not only shape people's lived experiences, but also provide them a sense of self through membership in these socially constructed groups (Tajfel, 1981). Thus, socially constructed groups such as race, gender, class, ethnicity, and sexuality interact in complex ways to constitute people's social identities.

By incorporating multiple social factors that shape people's experiences, intersectional approaches move away from the dichotomies of privilege and oppression and argue that no social group is homogeneous. Individuals in each social group, including ITAs, carry multiple identities, some of which are oppressed in certain situations and some privileged. Hence, an individual can simultaneously experience privilege and disadvantage based on their multiple identities. As Simien (2007) notes:

Knowing quite simply that a woman lives in a sexist society is insufficient information to describe the complexity of her daily social interactions. Such diverse life experiences as stereotyping, silencing, and marginalization do not lend themselves to simple, categorical analysis based solely upon gender. It is also necessary to know the race, ethnicity, sexual orientation, religion, and class of the woman in question in order to describe said experiences accurately, especially when individuals can experience disadvantage and privilege simultaneously through the combined statuses of gender, race, and class. (p. 267)

In order to use intersectionality as a research lens, Smooth (2010) identifies five guiding principles. First, intersectionality rejects the additive model which assumes that if one keeps on adding social categories, the experiences of privilege or oppression of individuals can be understood. It rather advocates for an intertwining or intersection of identities. This means that we cannot understand the experiences of ITAs simply by adding the experiences they have due to the different identities they have. While working as a teaching assistant, ITAs carry multiple identities with them such as those of an international student, an engineer, an engineering graduate student, and a budding teacher and researcher, along with various social identities such as nationality, gender and ethnicity. We need to simultaneously look at all the identities that shape an ITA's experiences to get a complete picture.

Second, it suggests that there is variation within each identity category. This means that there is no “one” way to experience internationality. Thus, it can be argued that there is variation among the experiences of ITAs. Talking about how race influences the experiences of international instructors, for example, Mohanty (2011) notes:

The daily experiences of a dark-skinned Malaysian-American professor are likely going to be much less pleasant than those of a light-skinned Ukrainian faculty member, and that has nothing to do with the talents and capabilities of the two individuals in question. The fact that they are both “international faculty” says very little in many contexts, and it is only by looking at the way they respond to their racialized social identities as residents of the United States, that we will write a fuller story of what happens to international faculty on our campus and in our society. (p. 121)

Similarly, it can be argued that other social identities such as gender, class, and cultural backgrounds lead to variations in the experiences of different international teaching assistants.

Third, it recognizes that the social statuses of each identity category changes over time and over geographical locations. Hence, an identity category that was marginalized in the past can become less marginalized in present times. For example, there has been a growing recognition of cross-cultural, linguistic, and pedagogical skills brought by ITAs in a US classroom (Pae, 2001; Yep, 2014; Zhou, 2009). Similarly, it is possible that ITAs will have different experiences in an urban university located in a diverse city as compared to their experiences in a university located in a rural setting that has a relatively homogeneous student and faculty population.

Fourth, it accepts oppression and privilege as co-existing instead of treating them as mutually exclusive. Thus, a person can be oppressed (e.g., based on gender) and privileged (e.g., based on race) at the same time. Likewise, an ITA may be simultaneously privileged and disadvantaged based on their different social identities such as race, gender, class, and sexual orientation, which come into play to shape their experiences in the classroom. At the same time, engineering ITAs may enjoy disciplinary privilege as engineering often leads to relatively higher-paying jobs as compared to graduates from other disciplines.

Fifth, it aims to create social and institutional change to reduce power differential and address inequalities. As discussed earlier, ITAs in the US education system are often perceived as lacking in knowledge and skills to teach because of their different cultural backgrounds as

well as their status as graduate students rather than faculty (Yep, 2014). At the same time, ITAs may experience privilege and disadvantage in the classroom due to their social identities such as race and gender where an international White male TA may have more privilege than a Black domestic female. Using intersectionality as a research lens helps illuminate how ITAs' multiple identities lead to access and barriers, equities and inequalities, and advantages and disadvantages for them. By understanding how ITAs' multiple identities lead to both advantages and disadvantages, effective steps can be taken at the institutional level to address these issues of power and privilege and help ITAs grow as future academics.

2.6.2 Prior studies using intersectionality as a research framework

In drawing in intersectionality, I situate my work within a robust scholarly tradition of studies that have used intersectionality as a framework to understand 1) the complexity of people's lived experiences as a result of their intersectional identities, 2) the variation in the experiences of members belonging to each identity category, 3) the role of institutional, social, and other contextual factors in shaping people's experiences, and 4) people's experiences of oppression and privilege at the same time. As my research explores the experiences of ITAs, who carry multiple identities, as well as how their social identities shape their experiences, these studies further support my decision to use intersectionality as a research lens.

First, in using intersectionality to understand the complexity of experiences, Bruning, Bystydzienski and Eisenhart (2015) demonstrate how race, gender, and social class intersect with one another to influence the decisions of pre-college girls to pursue engineering. Through the story of Naomi, they demonstrate how despite being a female, her White, upper-class background encouraged and supported her to pursue engineering. On the other hand, Mikey's and Megan's non-White and low income backgrounds complicated their possibility of pursuing engineering. Similarly, in another study to understand the power relations in women's lives in Nepal, Mitchell (2013) found that her participants simultaneously positioned themselves not just as women but also as "low-caste, ethnically marginalized, and non-Hindu, or as daughter-in-law, economically poor and Dalit" (p. 188). In this study, Mitchell also found that these women's lived experiences were not the result of their gender or any other singular identity but a result of intersections of various identities with one another.

Second, intersectionality has been used by researchers to understand the variation in the experiences of people within one identity category. For example, in their analyses of power relations in IT education and work for Black women, Kvasny, Trauth, and Morgan (2009) found that a monolithic view of gender did not account for the influence of other salient identities such as race and class on the experiences of participants. Moreover, a monolithic view also disregarded the role of individual characteristics (such as intellect and personal dispositions), individual influences (such as educational and family status), and environmental influences (such as living conditions) in shaping how participants experienced and responded to discriminations based on race, gender, and class.

Third, prior studies have used intersectionality to explore the influence of contextual (institutional, cultural, and social) factors to study people's experiences. For example, in studies that explored young women's experiences in engineering, Foor, Walden and Trytten (2007) and Foor and Walden (2009) found that women's experiences resulted from the multiple identities they carried, and those identities intersected with the institutional and social structure of the engineering discipline. In Mitchell's (2013) study to understand power relations in Nepal, she found that not only did different women experience their gender in relation with other intersecting identities, but also that women experienced those identities differently in different contexts. For example, when women marry and relocate to live with their husbands, their experiences of how their identities interact with one another changes. More closely related to my research, when applying the intersectionality framework to understand how institutional and individual factors shape the kind of student feedback received by ITAs and how they respond to those feedback, Little (2016) found that "an ITA's language skills as one category of difference inadequately explains success or failure" (p. 233). Other categories of difference may minimize or exacerbate the linguistic challenges faced by an ITA. She notes that there are many factors, unalterable and alterable, that shape their experiences of teaching. The unalterable factors include student demographics, students' perception of the subject matter, class size, student-to-teacher ratio, course content, and departmental policies and procedures. The alterable factors include students' attitude toward the course, the amount and quality of interaction with students, instructional materials, and instruction methods. For instance, the researcher found that one of the participant's oral proficiency was not perceived to be problematic "due to factors such as her

cheerful willingness to help students, students respectfulness, and the context-rich environment” (p. 227).

Finally, scholars have used intersectionality to highlight how people can simultaneously face privilege and oppression. Through the story of a female non-EU national, Dora, Ludvig (2006) demonstrated how despite coming from the upper middle class in Bulgaria and having academic credentials, Dora was unable to find legal employment in Austria, and as a result, she had to extend her studies to keep legal residence permit. She was also forced to work in illegal low-paying jobs to sustain herself. Thus, while Dora “narrates herself as having dominant status” (p. 255) due to her class and academic qualifications, she has to face the disadvantages of being an immigrant.

2.6.3 Justification for using an intersectional approach for the study

As discussed earlier, the five guiding principles identified by Smooth (2010) help illuminate critical, under-examined components of ITAs’ experiences. This makes intersectionality an appropriate framework for understanding their experiences and how their social identities shape these experiences. Moreover, previous research has demonstrated that intersectionality is a powerful tool to understand the complexity and variation in experiences of individuals as a result of their multiple identities and how social and cultural factors shape those experiences, further supporting my decision to use intersectionality as a framework to study ITAs’ experiences.

The need for intersectionality to understand the multidimensionality of experiences in an educational setting has also been advocated for by other scholars. Hendrix, Jackson and Warren (2003) note that there is a lack in the research exploring the everyday negotiation of multiple identities of instructors and students in US classrooms. They further argue that “[w]hen the multiple identities [that individuals] bring to the classroom are not acknowledged and appreciated, [a] sense of invisibility is felt (p. 178).” Similarly, Yep (2014) recommends exploring the teaching journeys of international instructors (and teaching assistants) from the perspective of various intersectional identities, i.e., how the various identities of international instructors lead to their unique experiences in US academy. As intersectionality seeks to analyze people’s experiences from the perspective of intersectional identities and accounts for the

complexity and multidimensionality of experiences, it is a suitable framework to study engineering ITAs' experiences so that effective steps can be taken by universities to better engage them in the process of undergraduate engineering education.

2.7 Summary

In this chapter, I situated my study with Hofstede's (2001) theory of cultural dimensions by discussing how educational cultures vary from one another on the basis of four dimensions of culture developed by Hofstede. These differences in academic cultures, along with the nonnative-English-speaker status, lead to unique experiences of ITAs. The literature highlights cultural components of these experiences by discussing both the challenges and rewards of teaching in a cross-cultural setting. The challenges faced by ITAs, as discussed in the literature, include linguistic, cultural, instructional, and classroom management challenges. On the other hand, the rewards of the ITA experience include learning about different pedagogical skills and cross-cultural enrichment. The literature also provides autobiographical accounts of the strategies adopted by international TAs and faculty as they navigate through the experiences of teaching in the US. These strategies include modifying pedagogical strategies, seeking support, engaging with students, improving linguistic skills, and undergoing changes to identity. Besides discussing the experiences and navigational strategies that ITAs use, the literature on ITAs also suggests that they are perceived negatively by students and faculty despite bringing diverse pedagogical skills and cultural richness to US classrooms.

While prior research explores the experiences of ITAs and provides autobiographical accounts of how they navigate their experiences, it generally lacks a critical perspective that highlights the complexity of ITAs' experiences by illuminating nuances across their disciplinary, cultural, and social identities to provide systematic accounts of both experiences and navigational strategies. My research reduces this gap by focusing on engineering ITAs' experiences and navigational strategies, and using intersectionality as the theoretical framework and case study as the methodological framework, to explore how ITAs' social identities shape their experiences.

I have used intersectionality as the theoretical framework to guide my study. Intersectionality suggests that people live multiple and layered identities and may simultaneously

experience privilege and disadvantage due to these identities (Dill et al., 2007). ITAs carry multiple identities with them in a classroom. Some of these identities include their cultural identity, race, gender, nationality, non-native-English-Speaker identity, and graduate student identity. Given each ITA carries a unique set of identities with them, each of their experiences is unique. As intersectionality accounts for the variation in ITAs' experiences due to these different identities and the contextual factors that shape their experiences, it provides a suitable guiding framework to gain a more complete understanding of ITAs' experiences that is relevant to a large number of ITAs across different US universities.

Chapter 3: Methods

As discussed in Chapters 1 and 2, the purpose of my research is to understand the experiences of ITAs' teaching in US engineering classrooms. The specific questions that my study addresses are:

RQ1: How do ITAs describe the experiences of teaching engineering classes at US universities?

RQ2: How do they navigate these experiences?

RQ3: How do ITAs' social identities shape these experiences?

RQ4: What similarities and differences are present across the experiences of ITAs in engineering?

To answer my research questions, I conducted a multiple-case study that followed seven engineering ITAs during a semester of teaching. Data were collected through in-person interviews and weekly reflections. Data were analyzed through both *a priori* and emergent coding to understand how ITAs perceive and navigate their experiences of teaching engineering classes at US universities and how these experiences are shaped by ITAs' social identities. The following sections discuss in details the research design overview, participant recruitment and retention strategies, data collection and analyses methods, and ways of establishing trustworthiness and increasing transferability of the study. The full study was approved by Virginia Tech Institutional Review Board (VT IRB# 17-140).

3.1 Research design

3.1.1 Epistemological and ontological underpinnings

Preissle and Grant (2004) note that in fieldwork traditions, researchers have approached reality and knowledge as a continuum. Some scholars approach fieldwork from the position of objectivism which assumes that "meaning is independent of any consciousness, that things have intrinsic meanings to be discovered or revealed by inquiry" (Preissle & Grant, 2004, p. 171). On the other end of the continuum lies subjectivism, which assumes that meaning is attributed by the knower on the known, i.e., the researcher, using their past experience or knowledge, assigns meaning to what is to be known and produces first-hand accounts of their individual experiences. In the middle of this continuum lies constructionism, which assumes that meaning is created

through systematic negotiations between the researcher and the accounts of experiences produced by the researched. I entered my research field from a constructionist standpoint in that I saw research as a shared activity between the participants and the researcher (Preissle & Grant, 2004) and the knowledge of reality as co-constructed between the researcher and the participants. A constructionist worldview makes the nature of reality relational, i.e. it is dependent on the relationship between the person and the world. Thus, I saw the knowledge of my participants' experiences as co-constructed through my interactions with them. This, in turn, necessitated the use of qualitative research methods for my study. As discussed in Section 3.3, I used qualitative interviews and weekly reflections to collect data so that I could engage in dialogues with participants and co-construct their teaching experiences with them. Similarly, the process of data analysis relied on collaboration with participants in the form of member checks.

Besides a constructionist worldview, my epistemological and ontological assumptions were guided by John Dewey's views of experience. Clandinin and Roseisk (2007) discuss two salient features of Dewey's conception of experience that served as my epistemological and ontological grounding. The first is that Dewey's notion of experience is "transactional" in that during an experience, the physical and the social worlds are transformed through the human interaction and, at the same time, the human being is changed through their interaction with the physical and the social worlds. Thus, during my inquiry, the interaction between me and my participants shaped their experiences of teaching as it created a new kind of relationship between my participants and their teaching contexts. For example, a participant recounted during an interview that completing weekly reflections for this study helped them organize their teaching and come up with pedagogical strategies that could be implemented in their classes in the future.

The second feature of Dewey's conception of experience guiding my study is of continuity. As Clandinin and Connelly (2000) note, continuity is:

the idea that experiences grow out of other experiences, and experiences lead to further experiences. Wherever one positions oneself in that continuum – the imagined now, some imagined past, or some imagined future – each point has a past experiential base and leads to an experiential future. (p. 2)

Guided by this idea of continuity, I saw my inquiry as an event in the lives of my participants that generated new relations that in turn became starting points and parts of future experiences (Clandinin & Rosiek, 2007). Thus, I acknowledge that the present and the future experiences of my participants changed due to my interaction with them and the findings of my inquiry were influenced by the relationship I forged with my participants. Given the continuous nature of experience, the data collection built on previously collected data in that the periodic interviews conducted with the participants were guided by the analysis of the weekly reflections completed by them to elaborate on the themes that emerged in the reflections.

3.1.2 Research methodology: Multiple-case studies

I used a multiple-case study approach to conduct my study. Yin (2009) states that case study is an approach to empirical inquiry that “investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between the phenomenon and context are not clearly evident” (p. 18). I wanted to study how ITAs perceive and navigate their experiences of teaching engineering classes at Virginia Tech. Since I aimed to understand the experiences of ITAs during the academic terms when they are engaged in the process of teaching, their experiences could be seen as contemporary phenomenon. Moreover, the experiences of ITAs could not be separated from the cultural, linguistic, and academic contexts they came from and the institutional and cultural contexts they were teaching in. Hence, a case study approach was suitable to do my research work.

Yin (2009) further notes that the case study approach:

- copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result
- relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result
- benefits from the prior development of theoretical propositions to guide data collection and analysis. (p. 18)

As discussed above, there are many factors that influence the experiences of ITAs including their cultural and linguistic backgrounds, exposure to US culture, academic disciplines, prior teaching experiences, nature and level of class they are teaching, nature of teaching assignment, and their social identities. To help capture this richness, I used two different methods – in-person interviews and weekly reflections – to collect data in a way that each method of the data

collection built on the other. Also, I used earlier studies on ITAs' experiences and acculturation, along with intersectionality (as discussed in Chapter 2), as guiding propositions to collect and analyze data. A more detailed discussion of how these guide data collection and analyses appears in Sections 3.3 and 3.4.

I adopted the multiple-case study approach to conduct my inquiry, with each of my participants representing a case. Baxter and Jack (2008) note that a multiple-case study is used in situations when there is more than one case in the study and each case differs from others in terms of the context it is situated in. For my study, each participant was situated in a unique context on the basis their native academic culture, prior teaching experience, stay in the US, nature and size of class they were teaching, perceived English proficiency, and social factors such as race, gender, and ethnicity. Using a multiple-case study approach helped me analyze ITAs' experiences individually and compare and contrast their experiences across cases (Baxter & Jack, 2008), leading to a better understanding of how various factors shape ITAs' experiences. A multiple-case study design also aligns well with the theoretical framework, intersectionality, in that it helps analyze the similarities and differences across ITAs' experiences and highlight the contextual factors that shape their experiences.

Case Construction. Figure 3.1 (adapted from Miles, Huberman, & Saldaña, 2014) shows how I placed bounds on my study. The inner box represents the case, i.e. an ITA. The inner circle represents the individual context created by the individual factors and social identities of the participant such as nationality, gender, prior teaching experience, native academic culture, and self-perception of linguistic ability. The outer circle represents the institutional context created by institutional factors such as the nature of class taught by them, the nature of the teaching assignment, class-size, and departmental and university policies and values. Each of the participants was situated in a unique context determined by both individual and institutional factors. Consistent with multiple-case study methodology, the selection of cases provided both literal and theoretical replications based on context, as described in Section 3.2.4.

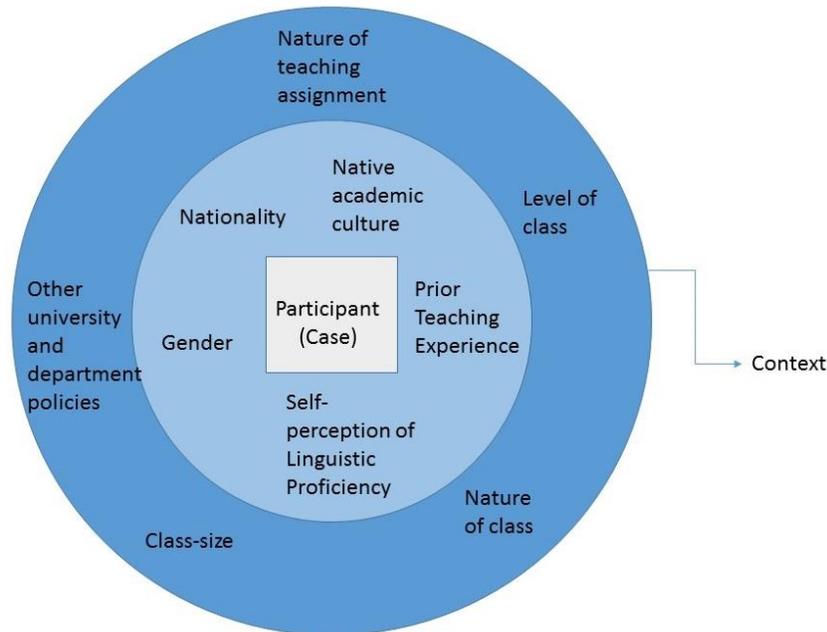


Figure 3.1: Visual representation of the case

3.2 Participants for the study

The participant pool for this study consisted of seven ITAs teaching engineering classes at Virginia Tech. The reasons for selecting participants from Virginia Tech were pragmatic. As a PhD Candidate myself, I understood the institutional context in which ITAs work at Virginia Tech. Moreover, given my constructionist worldview and the nature of research questions, it was important to build close relationships with participants through face-to-face interaction. Selecting participants from Virginia Tech offered easier access to my participants, which in turn led to an ease in conducting multiple face-to-face interviews with the participants during data collection.

At the same time, while Virginia Tech offered a convenient sample, the institutional characteristics also positioned it as a useful site for this exploratory study in that its profile is representative of many institutions that have a large number of international students. Virginia Tech is a public, land-grant university classified as a “Highest Research University” (R1) university according to the Carnegie Classification of Institutes of Higher Education (Indiana University School of Education, 2017). R1 universities account for about half of the international student enrollment at US universities (Institute of International Education, 2016) making Virginia Tech an appropriate site for this study. International students constitute about 40% of

the total on-campus graduate student enrollment at Virginia Tech. At Virginia Tech, international graduate students comprised 55.52% of on-campus graduate student enrollment in engineering in Fall 2014, 58.97% in Fall 2015, and 60.92% in Fall 2016 (Virginia Tech, 2017). These numbers are close to the national average of international graduate students in engineering in Fall 2015, which was 56.1% in Masters programs and 56.9% in PhD programs (Yoder, 2016). Recruiting participants from Virginia Tech also helped me achieve a wide variety in national backgrounds of participants. During Fall 2016, there were 2097 international graduate students from 94 different countries enrolled at the university, and almost half of them came from China, India, and Iran. Also, the university is fairly representative of the national average in terms of international graduate student enrollment in engineering.

The following sections describe how I defined an international teaching assistant for my study, how I reached out to ITAs and recruited them for my study, the details of ITAs who participated in and completed this study (including their demographics and teaching responsibilities), the steps I took to retain them for the entire duration of the study, and the compensation I offered them for their time and efforts.

3.2.1 Defining international teaching assistants (ITAs)

As noted above, my research explores how ITAs perceive and navigate their experiences while teaching engineering classes and how their social identities shape their experiences. Hence, the participants for my research were international teaching assistants. Researchers previously have defined ITAs in different ways. Kuo (2002) presents one definition of ITAs based on their English-speaking status and country in which they were raised. Kuo notes that ITAs are graduate students who were raised outside the US and are from a country where English is a second language. Similarly, Plakans (1997) defines ITAs as graduate students from foreign countries who are nonnative English speakers. In contrast Luo, Bellows and Grady (2000) define an ITA as “a graduate student who was born and previously educated in a country other than the United States” (p. 355), and do not consider the English-speaking status of students as a condition to call them international. Still other researchers have used the visa status of students in defining their international status. Jia and Bergerson (2008) define ITAs as teaching assistants on nonimmigrant visas who completed their K-12 and first postsecondary education outside of

North America. Smith, Byrd, Nelson, Barrett and Constantinides (1992) define ITAs as international graduate students on a nonimmigrant visa in the United States.

I defined an ITA as a graduate student holding a teaching assistantship on a nonimmigrant visa in the US and who had completed all their education except their graduate work outside the US. The reason for only including those ITAs who have completed their K-12 and undergraduate education outside the US is to ensure that the participants had little experience of studying in the US academic culture. As the goal of the study was to understand the experiences of ITAs who were relatively new to the US education system, this requirement ensured that they did not have a prior exposure to the educational cultures at the undergraduate level in US universities. This requirement helped highlight the cultural differences unmitigated by significant previous exposure to a different culture (Hofstede, 2001). Nonimmigrant visa status affirmed a non-US citizenship or residency of the student. This affirmation was important because international status constitutes a significant portion of an international student's social identity which, in turn, shapes their experiences at US universities (Osso, 2011). As I aimed to capture a full spectrum of linguistic experiences, participants' English-speaking status was not a criterion for defining ITAs in the proposed study. Also, as the study sought to understand how ITAs' social identities influence their experiences, the participant pool reflected variations in participants' social identities in terms of race, gender, and nationality to provide breadth.

3.2.2 Participant recruitment

Participant recruitment was done through a combination of electronic advertisement, in-person recruitment, use of flyers, and snowball sampling. I advertised the study and reached out to potential participants in multiple ways. The study was advertised to the potential participants (ITAs) through the weekly emails sent to all Virginia Tech graduate students through the Graduate School. I also asked the engineering departments at the university to advertise the study among the ITAs they hired. The email and the brief description of the study to reach out to potential participants are shown in Figures 3.2 and 3.3 respectively.

Dear Graduate Teaching Assistant,

My name is Ashish Agrawal and I am a PhD candidate in the Engineering Education department at Virginia Tech. For my PhD dissertation, I am conducting a study to understand the experiences of International Teaching Assistants (ITAs) teaching engineering classes at Virginia Tech. I am writing to invite you to participate in the study as a research participant. This research is designed to better understand the experiences of ITAs like you. Your experiences of teaching engineering classes at the university are critical to develop an understanding of ITAs' experiences.

If you are hired as a GTA in an engineering department during <study semester>, I would like to invite you to participate in the study. Participation would involve a screening survey, 3 interviews lasting approximately 45-60 minutes, and weekly reflections taking about 10-15 minutes each.

For your compensation, I will offer you \$20 in Kroger gift cards for participating in each of the three interviews (\$60 in total for three). For participating in the weekly reflection prompts, you will enter a raffle for the week you responded to the prompts. A winner will be randomly selected out of the ones who entered the raffle and will be given a \$25 gift card.

Your responses will be kept completely confidential. Published results will include summaries of responses, and any direct quotes will be assigned to a pseudonym. Importantly, your course instructor (or anyone responsible for evaluating your performance) will not have access to information about who chooses to participate in the study and what they say in journal reflections or interviews or during the class period.

If you have any additional questions about this study, please feel free to contact me at ashishag@vt.edu or 540-922-5125.

If you are willing to participate in the study, please let me know by responding to this email and I will contact you with further details.

Sincerely,
Ashish Agrawal

Figure 3.2: Email to potential participants

VOLUNTEERS NEEDED FOR STUDYING THE EXPERIENCES OF INTERNATIONAL TEACHING ASSISTANTS AT VIRGINIA TECH

VT researchers are conducting a longitudinal study during <study semester> to understand the experiences of international teaching assistants (ITAs) at Virginia Tech. You may be eligible to participate if you are a graduate teaching assistant in an engineering department at the university with an F-1 or a J-1 visa. The study involves 3 interviews lasting approximately 45-60 minutes each and weekly journal responses taking about 10-15 minutes each during <study semester>.

Compensation: You will be given a Kroger gift card worth \$20 after the completion of each interview. For responding to each week's reflection prompts, you will enter a raffle with other participants who participated in the reflection prompts that week. A winner will be randomly selected out of all who enter the raffle and the winner will get a Kroger gift card worth \$25. Please contact Ashish Agrawal from the Department of Engineering Education at 540-922-5125 or ashishag@vt.edu for more info.

Figure 3.3: Description of study for student groups and campus organizations

In addition, I went to classes and training sessions attended by graduate teaching assistants (such as Preparing the Future Professoriate, Contemporary Pedagogy, GTA Workshop, and others) and asked them to participate in the study. I also asked the instructors of these classes to advertise the study to their classes, and asked student groups (such as the Indian Students Association, the Nepalese Student Association and others) and other campus resource centers (such as Cranwell International Center and others) to advertise the study among international graduate students.

Finally, I put flyers at different buildings on Virginia Tech campus and distributed them personally to people who might be potential candidates for participating in the study. I handed out flyers to Virginia Tech students to further distribute them to other people who they thought might be potential participants for the study. The flyer is present in Figure 3.4.

Are you an international graduate student?

Do you teach engineering?

Do you want to share your experiences?

VT researchers are conducting a study to understand the experiences of international teaching assistants (ITAs).

Contact
Ashish Agrawal
ashishag@vt.edu
for more info.

Eligibility:

- Graduate Student at VT
- F-1 or J-1 visa holder
- On a GTA in engineering during Fall 2017

Participation Requirements:

- 3 in-person interviews (45-60 minutes each)
- Weekly reflections to be done by participants (10-15 minutes each)

Compensation:

- \$20 for each interview (\$60 in total)
- Chance to enter a \$25 raffle for responding to each reflection prompt

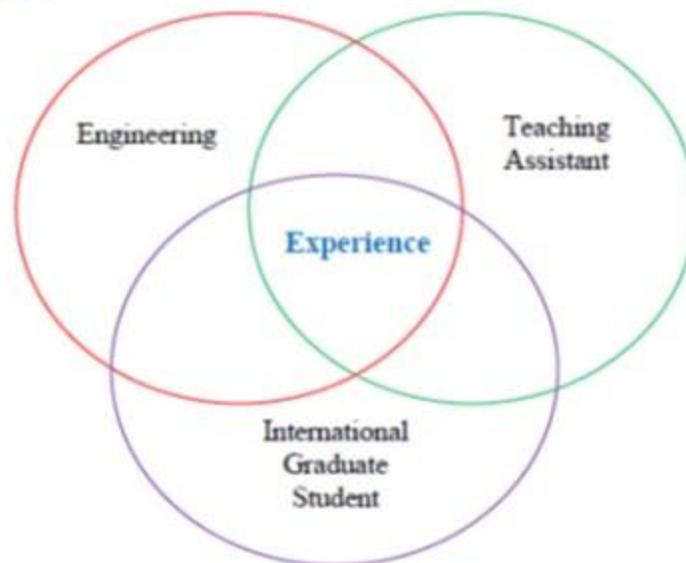


Figure 3.4: Flyer to advertise the study

Besides advertising the study through the Graduate School, academic departments, classes taken by GTAs, campus organizations, and personally distributing flyers, I used snowball sampling (Patton, 2001) in that I asked my acquaintances to participate in the study if they met the selection criteria. I also asked them and other acquaintances to further advertise the study to potential participants. Moreover, I asked the ITAs who had agreed to participate in the study to advertise the study to their friends and acquaintances.

3.2.3 Participant selection

Once a potential participant expressed interest in participating in the study, I sent them a screening survey developed using Qualtrics. The link to the survey was sent to the participants through email. Survey responses were directly stored in a spreadsheet. The screening survey asked participants about their demographic information, their teaching assignment, their visa status, and their prior academic experiences – participant characteristics that were used as sampling variables as discussed later in this section. The screening survey sent to potential participants is shown in Figure 3.5.

Thank you for your willingness to participate in the study aimed to understand the experiences of international teaching assistants in engineering disciplines at Virginia Tech. Please answer the following questions to give us some background information about yourself and the class you are assigned to teach in <study semester>. The answers to the following questions will be used to gauge your eligibility to participate in this study and select participants for the study. The answers to these questions will remain confidential and will not be shared with anyone other than research team members. Should you have any questions or concerns, please feel free to contact Ashish Agrawal at ashishag@vt.edu.

1. What is your name?
2. Which gender do you identify with?
3. What is your nationality?
4. Are you on a visa in the US? If yes, which kind of visa (F-1 or J-1 or any other)?
5. Please list where you completed your education including elementary school, middle school, high school, and college.
6. Which class will you teach in <study semester>?
7. Please choose all the options that describe your teaching responsibilities to the best of your current knowledge.
 - a. Teaching a lecture or a lab class
 - b. Grading
 - c. Holding office hours
 - d. Others (Please describe) _____
8. Have you ever worked as a TA at Virginia Tech?

Figure 3.5: Participant screening survey

A total of 18 individuals completed the screening survey. Twelve out of these were invited to participate in the study. The other six either did not meet the requirement of completing their K-16 education outside the US, were not teaching engineering classes, or posed potential conflicts of interest (e.g., they were teaching the same course I was during the semester).

Out of the twelve ITAs invited to participate in the study, ten agreed to participate. The first round of interviews were done with all ten participants. However, three out of ten discontinued participation after completing zero, one, and two weekly reflections, respectively, citing their inability to complete the weekly reflections due to their high level of coursework and research load. These three participants who dropped out of the study were contacted before the second interview to explore if they would be willing to participate in the interviews. None of them expressed an interest to do so. Since only seven participants completed the study, the term “participant” will henceforth refer to the seven ITAs who completed this study.

The seven participants represented variation in terms of their gender, nationalities, engineering discipline in which they were working as a GTA, level of class taught by them, and teaching experiences. There were five male and two female participants from four different countries as shown in Table 3-1. Participants were pursuing PhDs in different engineering departments, including Aerospace and Ocean Engineering, Computer Science, Electrical and Computer Engineering, Civil and Environmental Engineering, and Industrial and Systems Engineering. All were teaching courses in their home departments. Table 3-2 shows the academic level of the class taught by the participants, their teaching responsibilities, and prior GTA experience with the same course at the university. To protect participants’ confidentiality, nationality and gender data are not linked to course and discipline data in this dissertation. However, all variables were considered in the cross-case analysis (see Chapter 4), where patterns were reported by individual variable.

Table 3-1: Participant demographics

Country of Origin	Number of male participants	Number of female participants	Total
China	1	1	2
Egypt	1	0	1
India	3	0	3
Iran	0	1	1
All	5	2	7

Table 3-2: Participants' prior teaching experiences and teaching responsibilities

ITA ID	Teaching responsibilities	Level of class teaching	Prior GTA experience with the same class
P1	Instructing the lab, Grading	Junior	No
P2 [^]	Grading, Holding office hours	Junior	Yes (taught the class previously as the Instructor of Record)
P3	Grading, Holding office hours	Senior	No
P4	Holding office hours	Sophomore	No
P5	Grading, Holding office hours	Sophomore	No
P6 [*]	Making assignments, Grading/Holding office hours, Instructing lab	Junior/Sophomore	Yes/No (taught the junior class before, first time teaching the sophomore class)
P7	Grading, Holding office hours	Junior	Yes

[^]Participant was a 10-hr GTA for a graduate course and a 10-hr GTA for an undergraduate course, the study focused on the experiences in the undergraduate course.

^{*}Participant was a GTA for two undergraduate courses, the details about the two courses are separated by a "/".

This sampling method allowed for both literal and theoretical replications. Literal replication is obtained through selection of cases that are anticipated to give similar results. Theoretical replication is obtained through selection of cases that are predicted to give different results but due to predictable reasons (Yin, 2009). All participants were recruited from the same university and college, and hence were guided by the same institutional expectations and policies. Additionally, all of them were working under the supervision of the course instructor(s) with none of them serving as an Instructor of Record. This kind of participant selection led to literal replication. Additionally, sampling participants in such a way that represented a variation in the level of class taught by them, course departments, their own engineering departments,

teaching responsibility, prior teaching experience with the same course, nationality, and self-identified gender led to theoretical replication. Having such a variation in participant characteristics makes the findings relevant to a large number of ITAs (Merriam, 1995). At the same time, sampling for cases in terms of theoretical and literal replication adds to the trustworthiness of findings (Yin, 2009). Table 3-3 presents how different variables will be factored in recruiting participants for the study.

Table 3-3: Participant selection criteria

Variable	Participant Characteristics	Reason for Characteristics
Immigration status	International student on F-1 or J-1 visa	ITA definition
Place of prior education	All studies prior to graduate work (K-12 and college) completed outside US	ITA definition
Site selection	All participants recruited from the same university and college	Literal replication
Type of teaching assignment	All participants working under the supervision of the course instructor(s)	Literal replication
Level of class taught	Pool represents participants teaching at different levels (sophomore, junior, senior)	Theoretical replication
ITA's engineering department and course department	Pool represents participants from and teaching classes in different engineering departments	Theoretical replication
Teaching responsibility	Pool represents participants leading lab sessions, holding office hours, and/or grading student work	Theoretical replication
Teaching experience	Pool represents participants with different levels of prior teaching experience with the same course	Theoretical replication
Nationality	Pool represents national diversity	Theoretical replication
Self-identified gender	Pool represents gender diversity	Theoretical replication

3.2.4 Participant retention and incentive

In order to encourage ITAs to participate and incentivize them for their time, I compensated them with gift cards from Kroger (a supermarket chain across the US). As discussed in the next section, each participant participated in three face-to-face interviews, one each at the beginning, middle, and end of the semester. For participating in each interview, each participant received a \$20 Kroger gift card. For participating in the weekly reflection prompts,

each participant entered a raffle for every week they respond to the prompts. A weekly winner was randomly selected out of the ones who entered the raffle and was given a \$25 gift card.

Besides incentivizing the participants for their time, I took steps to build rapport with my participants early in the research process. This was done by explaining to them how participation would help improve their teaching and create resources to better engage the future ITAs in the process of undergraduate engineering education. I reminded them that I would send them (which I did before the second interview) the initial case reports so that they could spot any error that might have occurred in capturing their experiences. I also let them know that all identifiers would be removed from the data before analysis was done to ensure confidentiality of the information they provided. Finally, I reminded them that they could contact me anytime they had questions or concerns about their participation. In addition to the various steps I took to build rapport with participants, my own status as an ITA also helped me gain their trust, which is evidenced by the fact that some participants asked me for suggestions to navigate their teaching experiences during the interviews. Penckofer, Byrn, Mumby and Ferrans (2011) suggest that establishing rapport with participants may be one of the key factors influencing their retention. As I collected data from each participant over a period of one semester, this rapport helped ensure that participants persisted through the full course of the study.

3.3 Data collection

Data were collected from the participants over the period of a single semester. The actual semester date is blinded in this dissertation to further protect participants' confidentiality. Collecting data over a semester-long period helped me understand the experiences of ITAs during various critical junctures such as the beginning, middle, and end of the semester. It thus provided a comprehensive picture of a single teaching experience.

Yin (2009) suggests that there are a variety of ways to gather data in case study research. For my dissertation work, I used research interviews and weekly reflections as ways of capturing ITAs' experiences. Face-to-face interviews were conducted at three points – beginning, middle, and end of the semester - and reflections were collected each week via email. Using multiple methods to collect data at different points in the semester served two purposes: a) it allowed me to triangulate the findings from different sources of data collected at different points of time and

hence provided a complex picture of the phenomenon (ITAs' experiences in this case) being studied (Mathison, 1988); and b) it allowed for an in-depth examination of participants' experiences, making the understanding of their experiences more trustworthy (Johnson-Bailey, 2004). Figure 3.6 presents a visual depiction of the data collection methods. The following subsections describe each of these methods in detail.



Figure 3.6: Visual depiction of data collection methods

3.3.1 Research interviews

Interviews are common modes of data collection in qualitative research. Interviews serve as a means to explore and gather experiences and stories that help the researcher gain a deeper understanding of participants' experiences (Van Manen, 1990). Thus, they facilitate the co-

construction of participants' experiences consistent with the constructionist worldview. Interviews are a very common method of generating qualitative data and have been used in several dissertation works (Huang, 2009; Little, 2016; Trebing, 2007) that have explored the experiences of ITAs.

For my study, I conducted three interviews with each participant. Each interview lasted for approximately 25-60 minutes. I used the interview guide approach, as suggested by Patton (2001), in that I identified a list of topics and issues to be covered during the interview in advance in an outline form, and the exact questions and wording of the questions were determined on the basis of how the interview progressed. This ensured that the interview was fairly conversational and allowed for new stories and themes to emerge during the interview process. The purpose and the type of data that were collected during the three interviews are discussed in the following paragraphs.

First interview. The first interview was conducted during the second week of classes. The purpose of the first interview was to: 1) obtain the background information about each participant that helped in the development of a case description about each participant, and 2) introduce the participants to the study and the requirements for participation. The interview involved collecting participants' demographic data and background experiences by asking them about their linguistic proficiency, prior teaching and work experiences, prior stay in the US, and their future plans once they finish their graduate education. This interview also gathered information about the participant's teaching assignment, prior experience with the course they were assigned to teach, their anticipation of experiences as a teaching assistant, and the support provided by the university and/or the department to help them in their teaching responsibility. Before the start of this interview, I formally introduced the participants to the purpose of the study, explained the requirements of participation, answered their questions and concerns, and obtained their informed consent to proceed with the study. Table 3-4 lists the interview questions, potential probes and follow ups, and the type of information I got from each response for the first interview.

Table 3-4: First interview protocol

Q#	Question	Measure
<i>Demographic information and prior educational experiences</i>		
1	Which country are you from? <i>Follow up:</i> How long did you stay there before you moved to the US?	Country of origin, Social identities
2	Why did you move to the US?	Reason for coming
3	How long have you been in the US? <i>Follow up:</i> Had you lived in the US before your MS/PhD?	Stay in the US
4	When did you start learning English? How often and in which circumstances did you use English?	Linguistic proficiency
5	Please describe your prior educational experiences. <i>Follow up:</i> How was your K-12 educational experience? <i>Follow up:</i> How was your undergraduate experience? <i>Follow up:</i> What differences are you noticing right now? <i>Follow up:</i> How has the transition been?	Prior educational experiences, social identities
6	Have you taught before? When? Which classes?	Prior teaching experience
7	What other work experiences, if any, have you had?	Prior work experience
8	Could you talk about your family status? In your home country? Here in the US?	Social identities
9	What do you plan to do after you finish your PhD?	Future plans
<i>Questions about upcoming teaching assignment</i>		
1	Which class are you going to teach in the coming semester? <i>Follow up:</i> Tell me more about the class, student size, nature of teaching, level of class. <i>Follow up:</i> What is your role in teaching the class? <i>Follow up:</i> Are you planning to do mid-semester evaluation of teaching? If yes, when?	Teaching responsibilities, evaluation of teaching
2	Have you taken or taught this class before? <i>Follow up:</i> If yes, when?	Prior experience with the class currently teaching
3	If you took this class (or a similar class) during your undergraduate, can you describe what the course was like? <i>Follow up:</i> What similarities or differences do you expect you will experience in this course as compared to what you had in your home country?	Anticipation of experiences
4	What are some of the rewards of teaching this class that you anticipate?	Anticipation of experiences
5	What benefits or strengths do you see yourself bringing to the class? Personally? As an international GTA?	Perceived strengths
6	How much prepared do you feel about teaching this class? Please explain. <i>Follow up:</i> What challenges do you think you may face?	Level of preparedness, Anticipation of experiences
7	Were there any support structures made available by the department or the university to better prepare you to teach this class? If yes, could you describe them?	Availability of support

Second interview. The second interview was conducted in the last third of the semester (10th – 12th week) when more than half of the reflection prompts had been sent out to the participants. The goal for this interview was to help triangulate the data collected through weekly reflections and further elaborate upon the on-going experiences while they were still fresh in participants' memories. In this interview, I asked participants to elaborate on their experiences, their navigational strategies, their social identities that led to these experiences, and how their experiences compared with what they had anticipated in the beginning of the semester. The interview questions, potential probes and follow ups, and the type of information I got from each response for this interview are listed in Table 3-5.

Third interview. The third interview was done after the submission of final grades for the semester. This interview provided the participants with an opportunity to holistically reflect on their teaching experiences, while also addressing any new experiences or issues that occurred in the last third of the semester. In this interview, I asked the participants about their overall teaching experiences, navigational strategies, and factors that shaped these experiences. This interview also probed the ITAs about suggestions for hiring departments (or colleges) and course coordinators to help ITAs better engage in the teaching process and recommendations to help future ITAs. Table 3-6 lists the interview questions, potential probes and follow ups, and the type of information I got from each response for the third interview.

The second and the third interviews were semi-structured and followed the “diary: diary-interview” method as described by Zimmerman and Wieder (1977), in which participants' written reflections were used to develop semi-structured interview questions. As discussed in the next sub-section, I asked the participants to write weekly reflection entries based on their experiences of teaching. These weekly reflections were used to develop interview questions for the second and the third interviews. As the prompts for these interviews were guided by the weekly reflections completed by the participants, there were slight variations in the prompts for these interviews for each participant.

Table 3-5: Prompts for the second interview

Q#	Question	Measure
1	Tell me about your GTA assignment and responsibility. <i>Follow up:</i> How does it compare with what you had anticipated?	Teaching responsibilities, Experience
2	How would you describe your experiences of teaching so far? <i>Follow up:</i> What has led to these experiences? <i>Follow up:</i> Other questions based on participant's responses.	Experience, Social identities
3	Overall, what are some of the most rewarding aspects of this teaching assistantship? <i>Follow up:</i> What do you think leads to these experiences? <i>Follow up:</i> How do these rewards compare with what you had anticipated in the beginning of the semester?	Experience, Social identities
4	Overall, what are some of the challenging aspects of your GTA responsibility? <i>Follow up:</i> Why do you think you have these challenges? <i>Follow up:</i> How do you navigate these challenges? <i>Follow up:</i> Does anyone help you in the process? Who? How? <i>Follow up:</i> How do the challenges that you face compare with your anticipated challenges in the beginning of the semester?	Experience, Navigational strategies, Social identities
5	How do you see your strengths playing out in the classroom? Personal strengths? Strengths as an international GTA?	Experience, Social identities
6	Based on your weekly reflections, it seems like <name the incident/experience> was particularly challenging/rewarding/significant for you. Could you talk a little more about it? <i>Follow up:</i> What led to that experience? <i>Follow up:</i> What did you learn out of that experience? <i>Follow up:</i> What did you wish you had known before that experience? <i>Follow up:</i> How would you do things differently after that experience? <i>Follow up:</i> Other questions based on participant's responses.	Experience, Navigational strategies, Social identities
7	What are your suggestions for a first time teaching assistant who is assigned the same responsibility as you?	Navigational strategies, Recommendations for future
8	Is there anything you would like to add about your teaching experiences?	Catch all

Table 3-6: Prompts for the third interview

Q#	Question	Measure
1	<p>Overall, how would you describe your experiences of teaching this past semester?</p> <p>Follow up: What were the factors that led to those experiences?</p> <p>Follow up: Other questions based on participant's responses.</p>	Experience, Social identities
2	<p>Are there other TAs in the course? If yes, who are they?</p> <p>Follow up: How does their experience compare with your experiences in the course?</p> <p>Follow up: How does their experiences compare with your experiences in the department?</p>	Social identities
3	<p>How does your experience compare with other instructors in the department?</p>	Social identities
4	<p>Overall, what were some of the most rewarding aspects of this teaching assistantship?</p> <p>Follow up: What do you think led to these experiences?</p>	Experience, Social identities
5	<p>Overall, what were some of the challenging aspects of your GTA responsibility?</p> <p>Follow up: Why do you think you had these challenges?</p> <p>Follow up: How did you navigate these challenges?</p> <p>Follow up: Did anyone help you in the process? Who? How?</p>	Experience, Navigational strategies, Social identities
6	<p>Based on your weekly reflections, it seems like <name the incident/experience> was particularly challenging/rewarding/significant for you. Could you talk a little more about it?</p> <p>Follow up: What led to that experience?</p> <p>Follow up: What did you learn out of that experience?</p> <p>Follow up: What did you wish you had known before that experience?</p> <p>Follow up: How would you do things differently after that experience?</p> <p>Follow up: Other questions based on participant's responses.</p>	Experience, Navigational strategies, Social identities
7	<p>If you were to teach this class again, what changes will you make?</p> <p>Follow up: Are there any resources from the course instructor/department/university that would have helped you do this job better? If yes, what are those?</p> <p>Follow up: If you were to give any feedback to the university/department/course instructor, what would that be?</p>	Navigational strategies, Recommendations for future
8	<p>Overall, how is teaching different in the US as compared to that in your home country?</p> <p>Follow up: How did you navigate these differences?</p>	Experience, Navigational strategies
9	<p>Overall, how is teaching different in the US as compared to that in your home country?</p> <p>Follow up: How did you navigate these differences?</p>	Experience, Navigational strategies

10	What advice would you give to a teaching assistant teaching this class? Domestic teaching assistant? International teaching assistant?	Navigational strategies, Recommendations for future
11	Is there anything you would like to add about your teaching experiences?	Catch all

3.3.2 Weekly reflections

As Clandinin and Connelly (2000) note, written reflections are “a powerful way for individuals to give accounts of their experience” (p. 102). Besides providing a way for individuals to give an account of their experience, written reflections also help them make sense of their experience; hence they are a useful way of collecting experiences. Reflections written by participants were used by Blake Jr. and Haines (2009) to understand the developing belief structures of preservice teachers about what it means to teach science.

I used a weekly reflection prompt that could be completed by the participants in about 10-15 minutes. The prompt asked participants about their teaching experiences over the past week and how they navigated their experiences. Specifically, participants were asked about one event or activity or experience that was particularly challenging or rewarding for them and how they responded to that experience. I sent the reflection prompts to the participants in an email each Thursday of the week, starting the second week of the classes and continuous through the end of the exam week. Participants who did their first interview after the Thursday of the second week were sent the first reflection prompt after the interview. Prompts were not sent during the week of the Thanksgiving, when the university was closed for students and classes did not meet. A reminder to respond to the prompts was sent to participants who had not completed their reflection on the following Tuesday. The benefit of using emails over methods that store data in a spreadsheet (such as Qualtrics) was that it gave me an opportunity to ask the participants for clarifications or details, if needed, in the response to the email, and to create an ongoing dialogue with them.

The reflection prompts sent to each participant along with the type of information to be gathered from each question is presented in Table 3-7. There were three sets of prompts that asked participants to reflect on one of the three aspects of their teaching experience each week: 1) the most significant experience, 2) the biggest achievement, or 3) the biggest challenge. The

three set of prompts were sent in regular rotation, i.e., the first set was sent during weeks 2, 5, 7, 11, and 14; the second set during weeks 3, 6, 9, 12, and 15; and the third set during weeks 4, 8, 10, 13, and 16. The prompts were adapted from Lutz's (2017) study that aimed to understand the workplace learning experiences of recent engineering graduates. There were two similarities between my study and Lutz's that made the journal prompts from Lutz's study a good model to adapt for my work. First, both studies explored the lived experiences of individuals in a work environment. While Lutz's study captured the experiences of recent engineering graduates in their workplace, my study aimed to capture the experiences of ITAs at Virginia Tech, which provided a work environment for ITAs. Second, both studies used weekly reflections to develop follow up interview protocols for participants. For each week, I sent one of the three sets of prompts to each participant.

Table 3-7: Weekly reflection prompts

Q#	Question	Measure
<i>Set 1: “Significant Experience” prompt</i>		
1	What was your most significant experience in the context of teaching during the past week?	Experience
2	Why do you think the above-mentioned experience was important?	Experience, Social identities
3	What led to this experience?	Social identities
4	How did you navigate this experience?	Navigational strategies
5	Did anyone help you navigating this challenge? If yes, how?	Navigational strategies
6	What lesson have you learned for future from this experience?	Navigational strategies
<i>Set 2: “Biggest Achievement” prompt</i>		
1	What was your biggest achievement related to your teaching during the past week?	Experience
2	Why do you think it was a big achievement?	Experience, Social identities
3	What did you do that led to this achievement?	Social identities
4	Did anyone help you with this achievement? If yes, how?	Navigational strategies
5	What lesson have you learned for future to help you reach such achievements?	Navigational strategies
<i>Set 3: “Biggest Challenge” prompt</i>		
1	What was your biggest challenge related to your GTA work during the past week?	Experience
2	What made the above-mentioned experience so challenging?	Experience, Social identities
3	What do you think led to this situation?	Social identities
4	How did you navigate this challenge?	Navigational strategies
5	Did anyone help you navigating this experience? If yes, how?	Navigational strategies
6	What will you do in future to avoid such situations?	Navigational strategies

Using reflections by participants as a data collection method offered multiple benefits over participant observation. First, reflections did not alter the naturalistic setting in which ITAs were teaching; in observational research, the presence of the researcher may lead to changes in the behavior of students or the ITA and hence modify the experiences of ITAs (Patton, 2001). The reflections thus minimized disruptions to the course environment. Second, using reflections instead of observations required less time from the researcher to capture the experiences of participants, which allowed me to recruit more participants for the study and get a more comprehensive picture of ITAs’ experiences (Zimmerman & Wieder, 1977).

3.3.3 Data management

Adequate steps were taken to maintain the privacy of data and confidentiality of participants throughout the study. The interview data were audio-recorded and transcribed by professional services. These transcriptions were checked for accuracy by me by listening to the audio files and simultaneously reading the transcriptions for correctness. All the audio files and transcribed interviews were stored on a password-protected Google Drive folder. Backup data were stored in password-protected folders on my computer in my work office. The weekly reflections were also transferred from my Gmail account to the Google Drive. During the transcription of interview data and transferring of reflections to the Google Drive, each participant was assigned a pseudonym and all the identifiers from data were removed. This plan of protecting the privacy of data and confidentiality of participants was approved by the Virginia Tech Institutional Review Board (VT IRB # 17-140).

Besides ensuring the protection of data, I also tracked the data collected over the course of the study using a spreadsheet. Table 3-8 shows how data management was done. As shown in the table, the first column represents the pseudonym assigned to the participants. The subsequent columns were used to track when the interviews were conducted with the participants and when the participants responded to the weekly reflection prompts. If a participant responded to a particular week's reflection prompt or participated in an interview, the cell was filled with the date when that was done. An empty cell indicated that the participant had not yet completed the corresponding activity. If a participant skipped reflection during a particular week, the corresponding cell for that participant in that week was marked as "No Response". This table not only helped track data but also helped identify participants who entered the weekly raffle for each week. Table 3-9 represents the data collected in terms of the number of interviews conducted with and weekly reflections completed by each participant at the end of the data collection period. As can be seen, each participant participated in three interviews and all but one completed more than 70% of the reflection prompts.

Table 3-8: Data management table

ITA ID	Interview 1	Interview 2	Interview 3	Reflection 1	Reflection 16
P1	xx-xx-xx					
P2						
P3						
P4						
P5						
P6						
P7						

*xx-xx-xx represents the date when the activity was completed.

Table 3-9: Data collection in numbers

ITA ID	Number of interviews completed	Number of weekly reflections completed
P1	3	15
P2	3	15
P3	3	7
P4	3	15
P5	3	14
P6	3	14
P7	3	11

3.4 Data analysis

As discussed earlier, participants' weekly reflections were used to develop interview prompts. Hence, data collection and analysis were done concurrently, though analysis continued after data collection concluded. Also, conducting data collection and analysis concurrently was necessary given the continuous nature of experience that guided my ontology. The continuous nature of experience suggests that each experience grows out of the past experience and leads to a new experience (Clandinin & Connelly, 2000). Hence, it was important to analyze the previously collected data to understand participants' past experiences so that subsequent protocols could be accordingly designed to explore their new experiences.

Two techniques as suggested by Yin (2009) were used for data analysis – development of case descriptions and cross-case analysis. To this end, data were analyzed using codebooks to obtain relevant themes about each ITA's experiences that were later used to develop case descriptions. Codebooks were developed based on the second and the third interviews, and weekly reflections. The first interview, which captured participants' background information and contextual details about their teaching assignment, was mostly used to develop case descriptions,

and capture salient variables for subsequent analysis. The following section describes the process of codebook development. The sections following describe how individual cases were developed and how cross-case analysis was performed.

3.4.1 Codebook development

My research aims to understand how ITAs describe the experience of teaching engineering classes, how they navigate those experiences, and how their social identities shape their experiences. To this end, I developed codebooks to analyze the data collected from the participants through interviews and weekly reflections. The development of the codebooks employed both *a priori* and inductive coding schemes. The process of codebook development drew on recommendations given by Miles et al. (2014).

Earlier studies on ITAs were used to develop *a priori* codes and initial codebooks. The codebooks generated using the *a priori* codes and categories were modified during the process of data analysis in three ways: 1) more codes and categories emerged from the collected data that did not fit into any of the *a priori* ones, 2) some of the *a priori* codes and categories did not fit the collected data and were modified to better describe the data, and 3) some of the codes and categories were removed from the codebook if no data fit them. The following sub-sections discuss how codebooks were developed for each of the research questions. The new codes emerging from the data were categorized into existing categories. If the emerging codes did not fit into any existing category, new categories were created to group them (Miles et al., 2014; Robson, 2011).

3.4.1.1 RQ1: ITAs' teaching experiences

The first research question aims to explore how ITAs describe their experiences of teaching engineering classes. To address this question, I used the four categories of challenges described by Kuo (2002), namely linguistic, cultural, instructional, and classroom management (See Section 2.2.1). While Kuo describes the four categories as types of challenges faced by ITAs, I used them as categories of experiences because ITAs had rewarding experiences in the same categories. The initial codes in these categories along with their definitions are provided in Table A-1 in the Appendix A. As noted earlier, I employed inductive coding during the process

of data analysis to modify this codebook by adding new codes, changing existing codes, and removing codes that were not used. The final modified codebook is presented in Table 3-10.

3.4.1.2 RQ2: ITAs' navigational strategies

The second research question explores how ITAs navigate their experiences of teaching engineering classes. Like the first research question, I used *a priori* coding to answer this question. The *a priori* categories for navigational strategies were obtained from the literature on navigation of teaching experiences, as discussed in Section 2.3.1. The initial categories for navigational strategies included working on pedagogical skills, seeking help, engaging with students, working on linguistic skills, and change in identity. The initial codes in each category along with their definitions are present in Table A-2 in the Appendix A. Like the first question, the codebook was modified during the process of data analysis by adding new codes and modifying and removing existing codes. The resulting codebook is presented in Table 3-11.

3.4.1.3 RQ3: Influence of social identities

The third research question explores how ITAs' social identities shape their teaching experiences. To address this question, I used an inductive coding scheme as suggested by Miles et al. (2014) starting with some initial social identity codes such as ethnicity, gender, class, and nationality. Coding was done in two cycles. The first cycle involved coding the interview transcripts and weekly reflections using descriptive and *in vivo* coding methods to identify the intersection of ITAs' social identities with their teaching experiences. A descriptive code assigns labels to a passage or chunk of qualitative data to summarize it in a word or a phrase. *In vivo* coding uses participants' own words or phrases as codes (Miles et al., 2014).

The second cycle of coding involved grouping the codes generated from the first cycle into a smaller number themes or constructs called "pattern codes" (Miles et al., 2014). This grouping was done on the basis of commonalities present in the first cycle codes so that all the codes grouped under one pattern code point to the same theme in the data. The pattern codes were finally grouped into categories based on how ITAs' social identities shape their teaching experiences. Using pattern coding also helped me in conducting cross-case analysis (discussed in Section 3.4.3) to find out similarities and differences in ITAs' experiences (Miles et al., 2014). The resulting codebook with the emergent codes and categories is presented in Table 3-12.

Table 3-10: Operationalized codebook for capturing ITAs' experiences

Category of Experience	Codes	Code Definition
English competency experiences (Definition: These are ITAs' experiences related to their competency in English. These exclude the ones related to linguistic experiences in their native language.)	Communication problems/concerns	ITA describes communication problems they face or faced in the past, or express concerns about communicating with students
	Problems due to using different English dialects	ITA describes problems they face or faced in the past due to difference in ways of speaking English
	Improvement in communication skills	ITA talks about improvement in their communication skills
	Confidence about communication ability	ITA expresses confidence about their English communication ability
	Use of different English dialects as a benefit	ITA describes using their different way of speaking English as pedagogical tool
Sociocultural experiences (Definition: These experiences pertain to the sociocultural differences in teaching and learning. Experiences in this category also include ITAs' use of their native language.)	Instructional environment	ITA describes an experience concerning the instructional environment (such as class size, facilities etc.) in the US as compared to that in their home country
	Content knowledge	ITA describes an experience related to their own or students' content knowledge as compared to that in their home country
	Student and instructor behavior	ITA describes the differences in their own and student behavior as compared to that in their home country
	Classroom diversity	ITA describes an experience concerning their knowledge about diversity (about race, class, gender, and other similar social factors) present in their class or lack thereof, and the associated teaching experiences
	Academic integrity	ITA describes an experience concerning academic integrity
	Use of native language	ITA describes experiences related to the use of native language with students in an academic setting

<p>Course preparation experiences (Definition: Course preparation experiences relate preparing for instructional responsibilities such as learning/relearning of course material and logistics of effectively delivering the content.)</p>	<p>Knowledge of course content</p>	<p>ITA describes experiences related to their knowledge of the course topics or lack thereof, and related positive or negative teaching experiences</p>
	<p>Learning/relearning of course content</p>	<p>ITA describes an experiences related to learning/relearning of the course content (includes doing experiments to learn it, going through assignment solutions, reading books etc.). Differs from knowledge of the course content in that here the ITA talks about what they are doing to prepare the course content rather than what their knowledge of the course content is</p>
	<p>Design/modifying course materials</p>	<p>ITA describes an experience of designing class slides, HW sheets, rubric, solution manual, exams, etc., including modification of the existing one to suit their needs</p>
	<p>Implementation of testing and grading schemes</p>	<p>ITA describes and experiences concerning implementation of testing and grading schemes in a fair and consistent manner (includes solving issues in test paper while proctoring, or ensuring consistency in grading – does not include preparing tests and/or rubrics)</p>
<p>Instructional experiences (Definition: These experiences relate to management of ITAs' instructional responsibility, which includes providing support to students in and out of classroom, and managing issues that came up in the process of supporting students.)</p>	<p>Supporting student learning</p>	<p>ITA describes an experience related to supporting student learning in terms of helping them learn course content, understand course policy, and avail accommodation</p>
	<p>Managing instructional time</p>	<p>ITA talks about an experience of managing the instructional time by simultaneously helping multiple students and covering the planned content</p>
	<p>Managing student behavior</p>	<p>ITA describes an experience of managing negative student behavior such as students being distracted in class, trying to get solutions from ITAs, or showing up without</p>

		appointments or not following email etiquettes
	Managing infrastructure/technology	ITA notes experiences related to managing technology or infrastructure and/or how it influenced their work
Workload management experiences (Definition: This category involves experiences of managing TA workload along with their own coursework, research, and personal commitments.)	Significant time taken by TA responsibility	ITA talks about the TA responsibility taking a significant amount of time
	Completion of TA work in a short time period	ITA describes an experience where they had relatively short period of time to complete their TA responsibility
	Management of TA work with other professional responsibilities	ITA talks about managing Grad school related or other professional responsibilities (coursework, conference travel, research) with GTA work
	Management of TA work with personal responsibilities	ITA talks about managing personal responsibilities (family, friends) with TA work

Table 3-11: Operationalized codebook for capturing ITAs' navigational strategies

Category of Navigational Strategy	Codes	Code Definition
Content and delivery strategies (Definition: These strategies include modifying both the course content and the teaching methods.)	Supporting student learning	ITA notes using the following strategies to support student learning: <ul style="list-style-type: none"> • Making connections with the real-world or relevant concepts • Using multiple examples • Modifying course topics • Providing remedial materials/sessions • Using active learning • Using instructional approaches from home countries
	Managing student rush	ITA notes using the following strategies to manage student rush: <ul style="list-style-type: none"> • Distributing time across students • Helping students in groups
	Managing student behavior	ITA notes using the following strategies to manage student behavior: <ul style="list-style-type: none"> • Establishing/reminding students of roles and expectations • Changing the amount of content covered • Using collaborative learning • Using miscellaneous strategies based on the context
	Addressing communication barriers	ITA notes using the following strategies to address communication barrier with students: <ul style="list-style-type: none"> • Using written communication • Continuing to engage with students
	Addressing sociocultural differences	ITA notes learning about sociocultural differences/US academic environment to better help students
Credibility-building strategies (Definition: The	Showing willingness to help students	ITA talks about having willingness to solve students' issues and helping them learn

strategies involve building rapport with students.)	Ensuring preparedness for GTA responsibility	ITA notes that they make sure they are prepared for their GTA work
	Being honest about their abilities	ITA notes being transparent about their ability to help students and their shortcomings with students
	Using feedback from students	ITA describes getting feedback from students taught by them and/or using that feedback
Workload management strategies (Definition: These strategies are the ones adopted by ITAs to manage their teaching workload with other responsibilities.)	Planning	ITA talks about planning for TA and other responsibilities by scheduling them and starting to work on them ASAP to save time and make more time for unforeseen situations
	Flexibility	ITA notes building flexibility into their schedules by adjusting it when needed and using idle times during classes/office hours or outside to complete TA work
	Using time-saving tools	ITA notes using time-saving tools that automate some of ITA work and hence saved some time
Support utilization (Definition: These strategies involve using available support to better execute the TA responsibilities.)	Using support from faculty	ITA describes seeking or getting help from faculty (course instructors/research supervisors) to navigate teaching workload or other TAship related concerns
	Using support from peers	ITA describes seeking getting help from fellow UTAs or GTAs or graduate students to navigate teaching experience
	Using support from university support system	ITA describes seeking or getting help from the university resources such as GTA Academy or CIDER

Table 3-12: Operationalized codebook for capturing the influence of ITAs’ social identities on their teaching experiences

Social Identity Category	Code	Code Definition
International (Definition: Influence of international aspect of participant's identity on their TA experiences as identified by the participants themselves)	English competency experiences/navigational strategies	ITA notes experiences and/or navigational strategies due to their non-native-English-speaker status
	Sociocultural experiences/navigational strategies	ITA notes experiences and/or navigational strategies related to cultural differences in teaching and learning
	Interaction with international students (in general)	ITA talks about how them being international influences their interactions with other international (both from home country and other countries) students
GTA (Definition: Influence of teaching assistant aspect (as opposed to being an instructor) of participant's identity on their teaching experiences as identified by the participants themselves)	Perceived expertise in course content and/or teaching skills	ITA notes their level of expertise (either as told to them by students or their own perception) or course content or teaching skills as compared to the instructor’s
	Responsibility for the course and student learning	ITA talks about their responsibility for student learning as compared to the instructor (both in terms of teaching load and student success) and the ability to make decisions related to course policy, student grades, etc.
	Access to resources	ITA describes their relative access to resources as compared to the instructor
	Relatedness to students	ITA talks about their level of relatedness to the students
	Management of Graduate School work with GTA responsibility	ITA notes managing their GTA workload with other responsibilities as a graduate student

3.4.2 Development of case descriptions

After the codebooks were developed and the interviews and weekly reflections by each participant were coded, I developed a case description for each ITA. Each case was developed based on the data collected from each participant in such a way that a clear picture of each participant’s experience was obtained, along with how they navigated those experiences. Moreover, I analyzed how their social identities and other contextual factors, including nature of

class taught and teaching responsibilities, shaped their teaching experiences. Developing a case description provided a holistic picture of each participant's experiences and navigational strategies, and helped illuminate the multiplicity of factors that influence their experiences (Yin, 2009). Figure 3.7 shows the case report template used to describe each case.

<p>Case number:</p> <p>Demographic information:</p> <ol style="list-style-type: none">1. Country of origin2. Gender3. Duration of stay in the US4. PhD Major5. Year in PhD6. English proficiency7. Family status (Details about family present in the US and back home)8. Prior teaching and work experiences <p>Description of class taught:</p> <ol style="list-style-type: none">1. Name, course department, and academic level of class taught2. Nature of teaching responsibility3. Class-size4. Prior experience with the same class5. Any other significant detail about the teaching assignment <p>Anticipated rewards and challenges:</p> <ol style="list-style-type: none">1. Anticipated rewards2. Perceived strengths3. Anticipated challenges4. Support from the course instructor, engineering department, and the university <p>Major themes from data:</p> <ol style="list-style-type: none">1. Topics discussed in weekly reflections2. Salient experiences and often used navigational strategies3. Influence of social identities on experiences4. Analysis of relationship between contextual factors, social identities, and experiences
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Figure 3.7: Case report template

3.4.3 Cross-case analysis (RQ4)

I performed a cross-case analysis after the development of all the cases for my study. A cross-case analysis is performed in case study research if the study consists of two or more cases. Cross-case analysis involves aggregating and synthesizing findings over multiple cases (Yin, 2009). For my study, this synthesis involved finding similarities and differences among cases and explaining the potential reasons for those similarities and differences based on the contextual factors and Hofstede's (2001) cultural dimensions. For example, I found that two participants

noted having difficulties in English-speaking and listening. After analyzing the contextual factors for these participants, I found that both these participants were from China. While, like other participants, they were exposed to English in their elementary or middle schools, their usage of English was limited to an English course that they took during school and college. Other participants, on the other hand, had elongated exposures to the language during college where the medium of instruction was English. Similarly, I looked for other factors that might have caused differences in participants' experiences. I used the spreadsheet as a tool to sort and visualize patterns across cases with each item in the case report template (Figure 3.7) as a column in the spreadsheet. Conducting this kind of analysis increased the robustness of findings as compared to the results from a single case as they deepened the understanding of ITAs' experiences being studied (Miles et al., 2014; Yin, 2009).

3.4.4 Reflective memoing

As I engaged in the process of collecting data, coding interviews and weekly reflections, developing case descriptions, and conducting cross-case synthesis, I was recording my thought processes and reflections in the form of memos. Miles et al. (2014) argue that reflective memos are a quick way to capture thoughts that emerge during the process of data collection, analysis, and reporting. They not only help capture the researcher's initial thoughts but also assist in synthesizing data by tying different pieces of data together. They also help monitor the decisions taken during the study and hence improve the trustworthiness of the research findings by clarifying the rationale for the decisions taken during the study (Creswell, 2007). I used these reflective memos at various stages in data collection and analysis. During data collection, I wrote memos about my rationale to ask particular questions to participants during follow-up interviews. After each interview, I reflected on how the interview went and the changes I could make to the subsequent interviews based on my experiences of conducting the last interview. During data analysis, I reflected on the reasoning for the choice of codes and their operational definitions, emerging codes and categories, and development of cases along with the similarities and differences among cases. Besides these, I also wrote memos about how my subjective biases might be influencing the decisions taken during data collection, analysis, and interpretation and how I was checking my biases. By helping monitor the researcher's thoughts and decision-

making processes, reflective memos help identify biases and subsequently address them, leading to an increase in the trustworthiness of the research findings.

3.5 Researcher's subjectivities, and trustworthiness and transferability of research findings

In qualitative research, the researcher is the instrument through whom data are collected, analyzed, and interpreted. This role is why the biases and beliefs of the researcher may influence the research process and the research findings. This influence, in turn, affects the trustworthiness of the research findings. In this section, I discuss my subjectivities and how they may have influenced this study. Also, I elaborate upon ways of increasing the trustworthiness and transferability of research results. Finally, I discuss some of the limitations in my research design and data collection methods.

3.5.1 Researcher's subjectivities

Our experiences shape how we see the world. We have these experiences through our interaction with people around us, our family, and our sociocultural settings. Looking at the world through our sociocultural lens leads to some subjectivities in how we see the world. These subjectivities influence our research and scholarly work. Peshkin (1988) argues that our subjectivities can “filter, skew, shape, block, transform, construe, and misconstrue what transpires from the outset of a research project to its culmination in a written statement” (p. 17). Especially in qualitative research, the culture, gender, history, and experiences of the researcher shape all aspects of the project, starting from the choice of the question to be addressed, the data collection and analysis strategies, and interpretation of the findings (Creswell, 2007). In this section, I will discuss my subjectivities, and how those may have impacted this research. I will also discuss the strategies that helped me minimize my subjective biases.

My subjectivities. I have at least two subjectivities that could bias the current study. First, I had worked as an ITA at Virginia Tech since Fall 2013 and was serving as a teaching assistant during the semester when the data collection was done. This subjectivity had three potential impacts on the study. My own status as an international teaching assistant brought me closer to other ITAs due to our shared experiences of teaching in a foreign country. This closeness made my participants more comfortable in sharing their experiences with me. For example, some of my participants not only felt comfortable in sharing their English competency-

related challenges with me during the interviews, but also trusted me enough to ask for my suggestions to navigate those challenges. Moreover, as an ITA, I had additional insights while writing about the experiences of ITAs as I myself am a member of the group I was studying. Staple (2006) notes that researchers who write as members of the society uncover something more detailed, nuanced, and accurate.

However, this benefit of researching as a member of the community came with challenges in that my ITA status could have impacted data collection, data analysis, and reporting. During the process of data collection, my shared experiences of being an ITA could have led me to believe that I knew what participants meant rather than probing for their experiences and perceptions fully. Similarly, during data analysis, my experiences as an ITA may have led me to interpret my participants' comments through my own experiences. For example, it is possible that during data analysis, I may have highlighted the challenges more than positive experiences. As Jones (2009) notes, it is easier to locate our oppression and challenges as compared to privileges and benefits. I have faced the challenges of being an ITA and hence may have focused more on the challenges faced by ITAs. Also, there is a possibility that I may have neglected how ITAs have benefitted from the resources available on the campus for international students and teaching assistants. I may also have focused more on how much ITAs contribute to student learning and enriching the multicultural environment of the university but not much on how much they themselves grew as a person through their experiences of being an ITA.

Besides data collection and analysis, my ITA status may also have influenced the reporting of the findings. It could have made me biased against reporting anything negative about international students and teaching assistants who are a minority in US universities and already face negative attitudes from students and administrators (Osso, 2011; Plakans, 1997). While international students (and teaching assistants) face negative attitudes, intolerances, and stereotypes from their domestic counterpart, there is evidence that international students come with their own opinions and attitudes toward race and can hold negative attitudes toward certain racial groups (Jenkins & Rubin, 1993; Talbot, Geelhoed, & Ninggal, 1999). I could have been hesitant to report the negative attitudes carried by ITAs given my own status as an ITA.

My second subjectivity that could have biased the study is my tendency to develop close relationships with participants. During data collection, I forged close bonds with research participants. Also, I knew some of the participants prior to the study as classmates in the graduate courses I took at the university or through interactions with them in other social settings. Therefore, it could have been difficult to judge them in a detached way while conducting research and reporting the findings without softening my judgment toward the participants (Peshkin, 1988). While the bond that I had with my participants made them comfortable sharing their experiences with me, it could also have softened my analysis of them due to my personal closeness to them.

Addressing subjective biases. Peshkin (1988) notes a researcher's subjectivities appear during all phases of the research process, including deciding the research questions, data collection, data analyses, and reporting of research findings. The above-mentioned subjectivities surfaced while drafting my dissertation proposal. During the initial drafts of my proposal and data collection protocol, I was mostly focused on capturing the challenges faced by ITAs while teaching engineering at US universities. My literature review section did not cover the positive aspects of being an ITA and the way I had framed my research questions focused only on capturing the challenges faced by ITAs. After feedback from my PhD advisory committee members, I included the rewards of being an ITA in my literature review and broadened my research questions to capture both the challenges and rewards of the ITA experience. These subjectivities also appeared during the data collection process when, at times, I evaluated participants' experiences as challenges and asked leading questions accordingly. Once I also used expressions during an interview that showed my disbelief toward the participant's experiences. I realized these biases while writing reflective memos and addressed them in subsequent interviews by taking a more neutral stance toward their experiences and avoiding leading questions.

While it is not possible to completely eliminate one's subjectivity, Peshkin (1988) suggests that one should constantly monitor oneself to tame one's subjectivity as an "untamed subjectivity mutes the emic voice" (p. 21). There are four ways through which I monitored my subjective biases. First, during data collection, I checked myself against assuming that I know what participants mean. By reflecting on experiences of conducting interviews, I became more

aware of asking probing questions instead of leading questions based on my experiences as an ITA. I practiced active listening skills during the interviews so that I could pay attention to what they were saying and accordingly ask probing questions. Second, I sought support from my co-advisers and committee members in critically looking at my work and pointing out any biases that were present in my data collection, analysis, and interpretation methods. My committee members, including my co-advisers, were very supportive in helping me formulate the research questions and design the data collection instruments in a way that holistically captured ITAs' experiences instead of being biased toward their challenges. Similarly, my co-advisers gave me constant feedback during the codebook development to modify the nomenclature and/or definition of codes so that the codebook accurately captures the collected data. Third, I became more reflective during the process of conducting research. This included writing reflective memos about my research experiences, as discussed in Section 3.4.4, and reading and re-reading my research journals to monitor if my biases were impacting the process of data collection or analysis in a significant way. I also reflected on how my personal subjectivities were impacting my research processes in the journal. As described above, based on my reflections, I took a more neutral stance while conducting interviews and avoided asking leading questions. Fourth, I collaborated with fellow graduate students during the process of data analysis to ensure inter-coder agreement on the development of codebooks (Creswell, 2007). More details about how I achieved inter-coder agreement are discussed in the next section.

3.5.2 Trustworthiness and transferability of research findings

Polkinghorne (2007) notes two threats to trustworthiness in capturing people's lived experiences: the difference in people's experiences and the stories they tell about those experiences, and the correlation between gathered data and the interpretation of those data. For my research, this meant that there might be differences in ITAs' actual experiences and the stories that they told me about their experiences. At the same time, there might be differences in the experiences described by ITAs and my interpretation of those experiences. I addressed these threats to trustworthiness and improved transferability of the findings in the following ways:

Data triangulation. I used data triangulation by a) collecting data from multiple participants, b) using two data collection methods, and c) collecting data at different times during the semester. As discussed earlier, data were collected with seven ITAs using two data collection

methods - in-person interviews and weekly reflections. Also, data were collected at different times during a semester including the start of the semester, the middle of the semester, and the end of the semester. This triangulation of data gave a rich and complex picture of ITAs' experiences (Mathison, 1988).

Making methods of data analysis explicit. In order to ensure the trustworthiness of my interpretation of ITAs' experiences, I explicated the process of data analysis by recording my research decisions and the rationale behind them in a research journal. In this journal, I reflected on my biases, the process of data analysis, and my interpretation of the collected data. This research journal provided support for the decisions taken during the data analysis process (Creswell, 2009). Moreover, while writing the results of this study (see Chapter 4), I provided quotes from participants' interviews or weekly reflections as evidence for the readers to support my interpretation (Polkinghorne, 2007). These quotes will give the readers an opportunity "to retrace the steps in the argument to the text and to judge the plausibility of the offered interpretation" (p. 484).

Inter-coder agreement. I used inter-coder agreement to further ensure the reliability of data analysis and interpretation at five different times during the analysis process. The first inter-coder agreement check was done in December 2017 when about three-fourth data were collected and half of the collected data were analyzed. During this check, I asked a peer (another graduate student, also conducting a qualitative study in the Engineering Education Department) to read through the current codebook and verify whether they agreed with the way I had categorized and defined the codes. Also, I asked the same graduate student to separately code some data. After that, I met with them to discuss any discrepancies in the definitions and categorizations of codes, and our coding of the data. Any differences in the code definitions, categorizations, and coding of data were resolved through discussion, leading to a modification in the codebooks (Creswell, 2009).

The second inter-coder check was done with my advisers in February 2018 when all the data were collected and three-fourths of the data were coded. During this check, my advisers reviewed the code definitions and groupings in the existing codebook. After that, we discussed ways to modify the definitions and change the groupings so that the codebooks more accurately capture participants' experiences.

For the third inter-coder check, I asked the same peer with whom I had conducted the first inter-coder check to code some of the data after I had coded all the data. We discussed the differences in our coding of data and I modified the existing codebooks based on that discussion. The fourth inter-coder check followed the similar procedure as the third one except this time, I asked my research group to code some data and discuss the differences. Both the third and the fourth inter-coder checks were done in February 2018.

The fifth and final inter-coder check was done with my advisers in March 2018 when they reviewed all the coded excerpts and the preliminary results and commented on their agreement with naming and definition of codes, assignment of codes to excerpts, and grouping of codes into categories. A codebook modification was done based on the discussion I had with my advisers. A summary of the inter-coder checks performed during data analysis is present in Table 3-13.

Table 3-13: Inter-coder checks during data analysis

Inter-coder check type	Time completed	Details
Peer check # 1	Half of collected data coded	Discussion of code definitions and coding of data
Adviser check # 1	Three-fourth of all data coded	Discussion of code definitions and grouping of codes into categories
Peer check # 2	All data coded	Discussion of coding of data
Peer check # 3	All data coded	Discussion of coding of data
Adviser check # 2	All data coded	Discussion of naming and definition of codes, assignment of codes to excerpts, and grouping of codes into categories

Debriefing (or member checks). I conducted member checks at two different points during the study. First, I shared the initial case reports with my participants before the second interview and asked them for any differences between their background details and my recording of those details. Second, I shared the case reports with the participants during May 2018 when all the data were analyzed, and asked for differences between their experiences and my interpretation of those. Besides asking for adding some clarifying details about their experiences in the case reports, most participants agreed with my interpretation of their experiences. Only one participant disagreed with my interpretation of their family details, which were then modified in the case report based on the participant’s suggestion. Sharing of interpretive

accounts with the participants added to the trustworthiness of research findings (Merriam, 1995) as the participants could check and verify my interpretation of their experiences for accuracy.

Thick description of participants and research setting. I have provided details about the study participants in terms of their nationality, gender, prior teaching experiences with the course they were teaching during the study period, level of class taught by them, and their teaching responsibilities in Section 3.2.3. Additionally, in Section 3.2, I have described the research site and how the characteristics of the research site support the transferability of the findings. While one of the principles of intersectionality raises concerns over the transfer of findings from one context to another (Smooth, 2010), these in-depth descriptions still allow the readers to determine to what extent the findings can be applied to other ITAs teaching different classes in different universities, hence increasing the transferability of the findings (Creswell, 2009; Geertz, 1973; Merriam, 1995).

3.6 Summary

This chapter outlined the research methodology and the methods that I used to understand how ITAs describe their experiences of teaching engineering in the US, how they navigate those experiences, and how their social identities shape their experiences. I used a multiple-case study methodology to conduct this study. The participants for the study were international teaching assistants in different engineering disciplines at Virginia Tech. Each participant was considered a case and data were collected from each of them using weekly reflections and in-person interviews. Data were analyzed using both *a priori* and emergent coding methods. Each case was developed based on the data collected about each participant and cross-case analysis was performed to find similarities and differences across the cases. Various techniques were adopted to increase the trustworthiness of findings including data triangulation, making methods of data analysis explicit, achieving inter-coder agreement during data analysis, and conducting member checks with participants.

The next chapter discusses the results of the data analysis, as presented in the form of codebooks in Tables 3-10, 3-11, and 3-12, in detail with example quotations within each category and code. Also, the next chapter presents the variations in participants' experiences and identifies patterns across cases and relates those patterns to the contextual factors associated with them.

Chapter 4: Results

The purpose of this study is to explore the experiences of international teaching assistants (ITAs) in US engineering classrooms, strategies adopted by them to navigate their experiences, and role of their social identities in shaping their experiences. To that end, this study addresses the following questions:

RQ1: How do ITAs describe the experiences of teaching engineering classes at US universities?

RQ2: How do they navigate these experiences?

RQ3: How do ITAs' social identities shape these experiences?

RQ4: What similarities and differences are present across the experiences of ITAs in engineering?

To address these questions, I conducted a multiple-case study with seven ITAs. As detailed in Chapter 3, data were collected using in-person interviews and weekly reflections during a single semester. Data were analyzed using both *a priori* and emergent coding. The *a priori* codes were developed from the existing literature on the experiences of ITAs and international instructors, then modified based on the codes and categories emerging from the collected data. Finally, cross-case analysis was performed to highlight the variations across participants' experiences and any noticeable patterns based on participants' nationality, gender, and other contextual factors.

The impetus for this study was the gaps in the literature on ITAs relative to disciplinary differences and systematic accounts of ITAs' navigational strategies. Equally important, prior ITA research does not adopt a critical standpoint exploring the issues of power and privilege experienced by ITAs in US academy. To address these gaps, this study explores engineering ITAs' experiences and navigational strategies using intersectionality as the theoretical framework. Intersectionality takes into account the various identities of ITAs and helps understand their experiences in a way that invites social and cultural critique.

This chapter presents the results of the data analysis in four sections, with each section addressing each of the research questions. The first section discusses the experiences of ITAs; the second one explores the navigational strategies they adopted; the third section highlights the

influence of ITAs' social identities in shaping their experiences; and the final section explores similarities and differences across the cases.

4.1 ITAs' teaching experiences

The first research question aims at understanding the experiences of ITAs. To address this question, I used the four categories of challenges described by Kuo (2002) - namely linguistic, sociocultural, instructional, and classroom management - as *a priori* categories. However, as data analysis progressed, I modified and operationalized these categories to reflect the experiences of engineering ITAs in this study. Based on the data analysis, I grouped ITAs' experiences into five categories: 1) English competency experiences, 2) Sociocultural experiences, 3) Course preparation experiences, 4) Student support and instruction management experiences, and 5) Workload management experiences. The following sections discuss each of these categories in detail, with representative quotations. Note that the example quotes were taken verbatim from interview transcripts and weekly reflections, and hence reflect the spoken language of the participants rather than standard academic English. In addition, to preserve gender anonymity, the pronouns they, them, and their are used for all participants. Some example quotes are also presented with "Px" as participant ID to preserve anonymity.

4.1.1 English competency experiences

The first category of experiences described by ITAs is related to their communication proficiency in English. Kuo names this category "linguistic." I changed the nomenclature as this category focuses on ITAs' ability to clearly communicate with their students in English, in contrast to other linguistic issues more closely associated with sociocultural experiences (Section 4.2.2). Experiences in this category include 1) problems due to communication proficiency, 2) problems due to different English dialects, 3) improvement in communication skills, and 4) confidence about communication ability. Experiences related to ITAs' English competency usually appeared during the interviews when participants holistically reflected on their teaching experiences.

4.1.1.1 Problems due to communication proficiency

As discussed earlier, many ITAs do not have English as their first language, and therefore generally face challenges while communicating with students in English. In this study, some participants noted these challenges that pertained to both listening and speaking. For example, one ITA reflected on how they, at times, could not follow students while conversing with them. At other times, they found it difficult to express their thoughts to students. As one participant explained:

The first thing is about the listening part - when they ask some questions maybe they speak too fast and I cannot follow them... The second difficulty is that sometimes it's hard to explain some difficulties using English because it is not my first language and sometimes you may [be] stuck in some important sentence. [Px, Interview 3]

In addition to challenges in listening and speaking associated with English proficiency, participants also noted difficulties in more generally communicating the course content to students. As a participant reflecting on their experience of teaching a lecture class explained:

I think I was able to communicate few things I wanted to and in that process I also learned that maybe, I'm not clear in getting the ideas across to the students. [Px, Interview 2]

In this quote, the participant noted how they felt they were unable to fully communicate the knowledge of the course content to the students. This example highlights how participants had communication problems other than listening and speaking issues.

4.1.1.2 Problems due to using different English dialects

In addition to experiencing issues in communicating proficiently with students, a few participants also described communication problems due to different ways of speaking English, i.e., differences in expressions, conventions, or pronunciation. For instance, one participant described how misunderstandings happen with students due to the difference in the way they respond to question tags. The participant noted in their home country, people answer the question in the question tag, in contrast with the US where people respond to the statement preceding the question tag. The participant explained this difference by drawing a chart (shown in Figure 4.1). As can be seen in the figure, the same question from a student has two different and opposite

responses in different countries, leading to confusion and misunderstanding between the ITA and students.

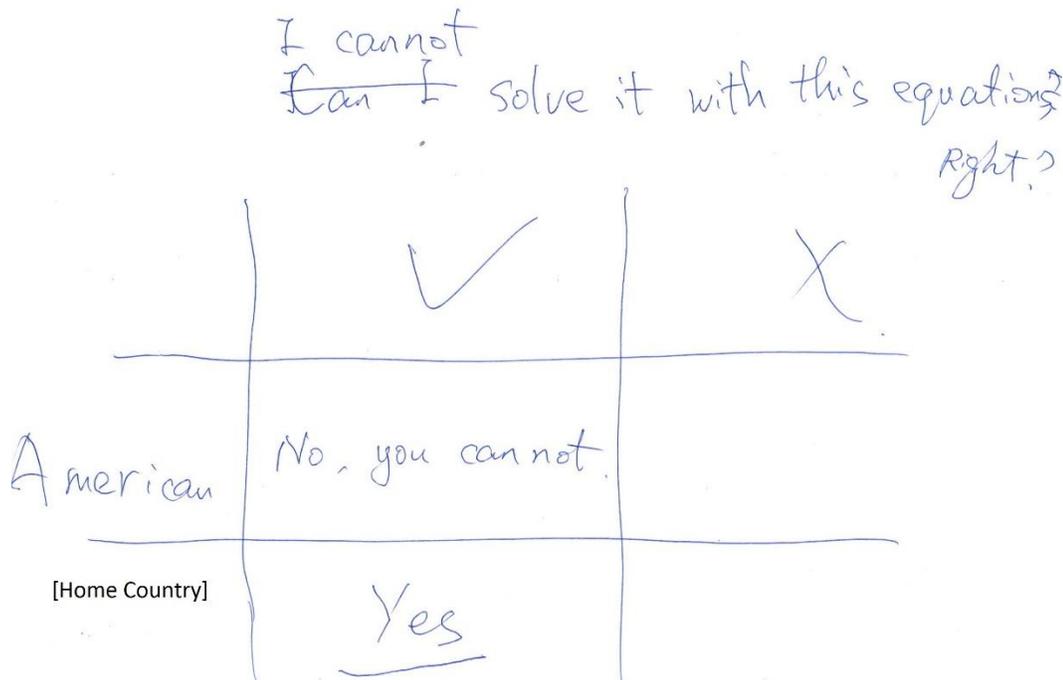


Figure 4.1: Differences in response to question tags

Similarly, participants also noted the challenges they faced due to different English pronunciations in English in different countries and lack of knowledge of some terminology used in the US academic context when they first arrived here. For example, an ITA noted the issues they faced due to the use of different terms to denote student academic level and different pronunciation of words in the US:

Even in my first semester, I would get confused by freshmen, junior, sophomore, senior – is it first, second, third year, fourth year. These are new terminology which the internationals they come up with. Then, there are a few things, there are some accents. In my first semester, I used to say array [phonetic pronunciation: ærei], A-R-R-A-Y but in US, it's array [phonetic pronunciation: ə'rei]. [Px, Interview 3]

In this instance, the participant reflected upon their initial semester of teaching at the university. During their initial semesters, they faced challenges in getting used to the different accents used in the US English and the terminology that is typical of US academic context.

4.1.1.3 Improvement in communication skills

While participants experienced multiple communicative challenges teaching in their non-native language, teaching and interacting with students also helped some ITAs improve their own communication skills. For example, one ITA noted:

I did not anticipate [in the beginning of my teaching assignment], but I wanted it to be that way, that I learn through these labs how to interact with a group of people. [Px, Interview 2]

As reflected in the quote, the TA experience improved the participant's ability to communicate ideas across a large group of students. The participant further elaborated that the teaching experience also helped them improve their presentation skills.

4.1.1.4 Confidence about communication ability

While multiple participants noted problems in listening and speaking, and communicating the knowledge of the course content to students, some participants also expressed confidence about their communication abilities. These participants cited their communication abilities as a strength that helped them effectively explain the course topics to students. As one participant reflected during the final interview:

If I know what I'm going to talk, I can frame the sentences decent enough and I can make the idea go through. Even if I have to explain a concept that I'm good at and I know what I'm talking about, it has never been an issue of telling these things. [Px, Interview 3]

As suggested by the above quote, this participant felt confident about their ability to communicate the knowledge of the course content to students if they were well-versed with the content knowledge. They further added that they had never faced communication issues while teaching.

4.1.2 Sociocultural experiences

The second category of experiences described by ITAs is sociocultural. Kuo names this category as "cultural" and defines it as pertaining to differences in educational practices, including instructional environment, relationship between students and teachers, academic honesty, and classroom diversity. I expanded Kuo's definition by including participants'

linguistic experiences in their native language in this category. Also, I renamed this category as “sociocultural” as some of the experiences in this category (such as classroom diversity, use of native language in classrooms) pertain to ITAs’ social settings. Participants noted two types of experiences in this category: 1) differences in educational practices, and 2) linguistic experiences. Like English competency experiences, participants described their sociocultural experiences during the interviews rather than reflecting on them in weekly reflections.

4.1.2.1 Differences in educational practices

Participants noted multiple differences between the education systems in their home countries and the US. These differences pertain to four general areas: 1) instructional environment, 2) content knowledge, 3) student and instructor behavior, and 4) classroom diversity.

Instructional environment. ITAs experienced multiple differences in the instructional environment in US universities as compared to their home countries in that they noted the US instructional environment to be learner-centered and better resourced in general. For example, some participants noted that class sizes are smaller in the US, which gives the instructor an opportunity to give better attention to students. They also described having better facilities (e.g., better infrastructure, well-equipped libraries) at US universities, which further aids student learning. Some participants also noted the interactive nature of US classrooms, which in turn helps the instructor to find better ways of explaining the topic. A few others noted how students are given a syllabus in the beginning of the semester that systematically lists the course topics on a weekly basis along with the assignments that students are required to do.

Besides small interactive classes and better resources available to students, one participant noted the difference in assessment methods employed in US classrooms as compared to their home country. They appreciated the use of continuous assessment in the US as teaching and learning approaches adopted in the US as compared to their home countries. This pushes students to engage in the learning process throughout the semester. As one participant reflected:

The major difference is the course -- how the course is taught. I'm from <home country>, and in <home country>, the major weightage of any course grading would be given to the final exams. At least 70% or 80% of the grade would be on the final exam. But in the

US, the major portion at least in computer science what I see is, the major portion of the grade is on projects and assignments which you are cumulatively accumulating your grade throughout the semester. In <home country>, you can just lay back throughout the semester and just work hard one week before the final exam and then you can get good grades. But it's not the case in US. That's why you see students working day and night in the library and everywhere throughout the semester because they know that "okay, this assignment, it's like 10% of my grade. It's a lot, I can just come from A to B if I don't do that." [P5, Interview 3]

The participant also talked about how this system of continuous assessment prevents students from getting a bad grade if they perform poorly in the final exam. As the final exam constitutes a relatively lower portion of the final grade, students can still get an overall better grade in the course if they have earned high scores in the assignments and tests through the semester.

Content knowledge. While participants noted some differences in instructional environment, several emphasized a shared instructional content. That is, while there were marked differences in the teaching environment, the concepts themselves were quite similar across cultures. This similarity mitigated some of the intercultural issues ITAs might have otherwise faced. As one participant noted:

At first, I talk about the cultural exchange but I think for an engineering class, it's not that obvious because we talk about an inductor, the circuits. We have same understanding of explanation of each symbols are the same. [P1, Interview 3]

As noted by the participant, they did not experience much cross-cultural differences in teaching because of the use of standard notations for electrical and electronic circuits and the components used in them.

While many participants talked about a shared knowledge of the course content in the US with their home countries, some also identified differences in the level of complexity and focus of the course topics, which influences the academic knowledge of students. A participant teaching a programming course, for example, noted that they did problems of higher complexity when they took the same course as undergraduate students in their home country. Also, the assignments in their home country required students to apply their programming knowledge to real-world problems, unlike the US classrooms where students were assessed based on their ability to write simple codes. Another participant teaching a programming course reflected:

In my undergrad, people are usually smarter than what we have over here. They are mathematically way more-- I don't know-- I don't think smart is the correct term, it's just that there, education, just how the education system is in <home country>, they are way more comfortable with the theoretical ideas. How that helps is that, after they figure out the Syntax of the coding part, they don't need anymore help, but if like here, your understanding itself is on weak ground, then no matter how much hard work you put into the language part, you won't be able to do [unclear]. But it's the <home country> curriculum is designed in that way that you're way more stronger in math in general. So I think that's what helps in general and makes it easier to explain it to them than the people over here. [P6, Interview 3]

In this instance, the ITA noted that during their undergraduate studies, there was a higher level of focus on understanding the theoretical underpinnings of programming. A deeper learning of theoretical concepts made it easier for students in the home country to understand the nuances of programming.

Student and instructor behavior. In addition to differences in student knowledge, some participants also described differences in student and instructor behavior, predominantly involving the power distance between the student and the instructor. For example, one ITA noted that the students have more autonomy in the US as compared to their home countries. As a result of this autonomy, US teachers cannot compel students to engage in certain class activities if the students do not wish to. As the participant reflected:

I think the instructor is much more strict [in my home country]. They can make rules on the students. More rules. In USA, I think the instructor should respect more on the student's decisions. For example, when I teach the <course name> in the summer session, one student- he usually comes very late and leaves very earlier. I want to talk with him about this, but my advisor suggest me not to do this. It is his own decision. If in <home country>, the instructor, when he leaves in the class, may ask him stop to do this in front of the students. [Px, Interview 3]

In the above quote, the participant contrasted the student power in US classrooms as compared to that in their home country. They noted that they would have stopped a student from engaging in behavior that they deemed to be inappropriate. But they were advised not to do so by their advisor in the US. In a similar vein, another participant noted how they could not stop a student from taking an exam or fail the student if they found the student cheating during the exam.

If you see any student here that is cheating on exam and you see him, you are not allowed to go and just take the paper out. In my country, it was so much different. If somebody see

you that you are cheating or something, they can just fail you and will take the paper from-- The examiner will fire you from the exam session. [Px, Interview 3]

A lower level of power distance was also experienced by participants in terms of how they conversed with the students. As one ITA reflected:

And also about the interaction between the professors and-- I don't know how to express it, the instructor looked from really above you when I was in <home country>. But here there are almost in the same level and I guess it is mainly because of the penalties and the regulation they have here. The students can go through the grad school or undergrad school [and] say, "Okay, I saw this kind of misbehavior here. And I am here to complain about it." But we don't have this case in <home country>. [Px, Interview 3]

In this quote, the participant described how they felt students had a lot more power in the US as compared to their home country. The ITA noted that students derived this power from the ability to complain about the instructors if they felt offended by their behavior. Hence, they always need to be careful during conversations and ensure that they are not offending any student.

Classroom diversity. Finally, some participants also noted significant diversity in the US classrooms in terms of student population. For example, a participant noted that diversity was present in the classroom in terms of students from various countries. This was quite unlike what they had experienced in their home country, where students were all from relatively similar cultural backgrounds in a classroom. Another participant noted the diversity brought by transfer students in the class.

I don't know whether this is very huge thing or not, but this transfer students is something that needs to be tackled in a sense that being an international TA, I had no idea of how transfer student system works. I know that they come from some other college, but I had no idea that they have completely different curriculum and sometimes they have not done the same things as the other. So it's not a level playing field in that sense. [P6, Interview 6]

As evident from the quote, the participant was unaware of the concept of transfer student and that these students had done some college courses at a different college with somewhat different curricula and course structure. Hence, they have a different prior knowledge of the course content. The ITA further elaborated that they had faced issues in supporting transfer students due to a lack of understanding of students' prior course knowledge.

4.1.2.2 Linguistic experiences

In addition to the sociocultural issues surrounding the educational context, a few participants also recounted sociocultural experiences associated with language. While several participants noted the presence of many international students in their classes, some also noted experiences they had while interacting with students from their home country in their native language. While one participant found it beneficial to talk with students from their home country in their native language, another ITA noted that they found it unprofessional for them or their students to use their native language during office hours:

*They just came to the office and started talk <native language>. I tried to answer them in English, because my friend told me that it is not something professional to just speak in different language with other student ... from your own country in your own language.
[Px, Interview 2]*

The ITA further added that it could be perceived that the students from their native country are getting preferential treatment by the ITA. Hence, they asked the students not to speak in native language during office hours. A shared native language thus had different values for different ITAs.

4.1.3 Course preparation experiences

The third category of experiences is related to course preparation. This category of experiences was not identified by Kuo, but instead emerged from the data collected for this study. Many participants described preparing for courses they taught as one of the most significant parts of their teaching assistantship, and these experiences appeared quite frequently in most participants' weekly reflections. Course preparation relates to 1) ITAs' knowledge of content (learning or relearning of course material) and 2) logistics of effectively delivering the content.

4.1.3.1 Content knowledge

The first component of course preparation involves ITAs' knowledge of the course content, which had direct bearings on the time and effort they had to put in to learn or relearn the course material. If an ITA was teaching a course that was different from their own expertise, they had to spend significant time learning the content. For example, a participant noted that it took

them a lot of time to learn the course content because it was different from their own research area:

The first few weeks, because I do not familiar with the electronics because my research area is <name of research area> and most of them are related to <name of research area>, and it's basically the analog circuit parts, but my research does not cover that topic, so I need to spend several hours to read the textbooks to figure out what is BJT amplifier, what is MOS amplifier, and so it takes more than 10 hours each week in the previous week. [P1, Interview 2]

As the participant noted, it took them more time than their expected time commitment for their GTA appointment (the participant had a 10-hr per week GTA appointment).

The nature of content preparation depended on participants' TA responsibilities as shown in Table 4-1. For those leading lab sessions, content preparation involved doing the lab experiments beforehand so that they could learn the correct experimental procedures and identify potential issues that students may face while doing the same experiments. For those ITAs who were required to hold office hours, preparation involved going through the homework and other course assignments and their solutions before the scheduled office hours. Some participants also noted learning the course content by reading textbooks and online resources to better equip themselves to help students during lab sessions and office hours.

Table 4-1 Course preparation tasks

TA responsibility	Associated task
Leading lab sessions	Doing the lab experiments beforehand to learn the procedures
Holding office hours	Going over the solutions of homework and other assignments
Learning course content	Reading textbooks and online resources

While the process of learning/relearning was time consuming, it also, at times, brought benefits for the participants. Some participants noted that the act of going over the course content to help the undergraduate students enhanced their own learning. For example, a participant noted that the content for the course they were teaching was helpful for their research and contained topics that are frequently asked by prospective employers during job interviews:

This course, there are a lot of special problems in this course. This course is very good for the interview but a small part is good for the research. But this course, there are a lot

of special problems in this course is good. It's similar with some kind of interview questions from the company. [P2, Interview 3]

Another recounted that teaching the course helped them understand the real-life implications of some of the concepts they were teaching students:

That's something actually in the course ... like how they calculate this 18-month [to pay off the debt on credit cards by paying the minimum amount] is something that we discussed with the students in the course. I'm just becoming more aware that those things are real, and I see them in real life. [P4, Interview 2]

The participant added that teaching helped them understand their own credit card statement and gave them insights into how to judiciously use their own credit card in a way so that they do not accumulate a lot of debt.

4.1.3.2 Course logistics

The second component of course preparation described by ITAs entails handling the logistics of delivering the instruction. This includes designing and modifying class slides, exams, and assessments, and formulating plans to effectively implement the testing and grading schemes.

One aspect of handling logistics included designing and/or modifying course materials such as class slides, exams, rubrics, and solution manuals, and was noted by most participants. Sometimes participants were handed course materials such as slides, exams, and rubrics by the course instructors, and they only needed to modify them to suit their needs. At other times, they had to design these from scratch. Several participants noted using their interactions with students to guide the design of class slides or exams. For example, one ITA described:

Basically the instructor, while he is forming the midterm questionnaire, he was asking us, "what do you suggest? which sections should have more difficult questions?" or "what doubts do you have in office hours?" I think we gave them a set of subsections where ... "you know students had more doubt in this particular section in this week itself. So I don't think you should ask that in the midterm which is happening this week." Or "they were really thorough in this, so just ask them really tough questions." Or "they were like really lacking in understanding this concept, so don't ask them that tougher question." So we just helped in forming questions. [P5, Interview 2]

In this example, the ITA noted suggesting exam questions to the course instructors based on their interaction with students during office hours. Addressing student questions during office hours

helped them learn about students' understanding of the course material, which the ITA used to help design tests that more accurately captured student learning.

A second aspect of logistics concerned formulating plans and strategies to successfully deliver the course materials and implement testing and grading schemes. One such experience constituted proctoring of tests and successfully addressing issues and student concerns that came up during proctoring, something that multiple participants noted. For example, one ITA noted encountering mistakes in the test questions and addressing them during proctoring:

During the proctoring of the second midterm, there were two questions with some mistakes... [W]e had to figure out a way around it quickly. [P6, Weekly Reflection 10]

Another issue, also identified by several participants, was to ensure consistency in grading student work, especially if the same assignment was graded by multiple TAs. For example, one participant noted:

I tend to grade everything in one session so that everything stays in my head how I graded the first one and the last one. So basically, it's more or less constant in me. [P5, Interview 2]

As discussed in the quote, the ITA graded all student submissions for an assignment in one sitting so that the grading scheme remains fresh in their memory, leading to consistency in awarding points to students on different questions. In order to ensure consistency in grading with other TAs in the course, the participant noted creating rubrics with other TAs and communicating any changes made to the rubric during grading to one another.

4.1.4 Instructional experiences

The fourth category of experiences described by ITAs relates to carrying out their instructional responsibilities, which included both supporting student learning in and out of classroom and managing dynamic issues that came up in the process of supporting students, including responding to student behavior, and managing classroom time. This category combines two of Kuo's categories – "instructional" and "classroom management." Kuo's instructional category relates to ITAs' knowledge of and ability to fulfill their instructional responsibility, while classroom management category relates to managing student behavior. I combined the two of Kuo's categories because both pertain to ITAs' instructional responsibilities and at times,

supporting student learning involved managing the instructional time (such as when there were multiple students seeking help). Additionally, experiences in both categories were dynamic in nature, and ITAs had to adopt slightly different approach each time to navigate them. Finally, I dropped “classroom management” from the nomenclature because some of these experiences happened outside the classroom. Note that none of the ITAs in this study was an Instructor of Record, and hence the experiences in this category pertain more to GTAs who support course instructors instead of themselves serving as Instructors of Record. The absence of ITAs serving as Instructors of Record may also be a possible reason for the blending of the instructional and the classroom management categories as most participants did not have significant in-class teaching as part of their TA responsibilities. Experiences in this category included 1) supporting student learning, 2) managing student behavior, 3) managing class time, and 4) managing technology.

4.1.4.1 Supporting student learning

Like course preparation, supporting student learning constituted a major part of participants’ teaching experiences across a range of settings. All participants frequently noted helping students learn course content in some form - understand difficult concepts during class sessions, perform experimental work during lab meetings, and understand and solve assignment problems during office hours and through emails, and understand why they received certain grades on assignments. Given the technical complexity of engineering courses, helping students often involved teaching complex concepts using real-world examples. For example, one ITA noted that they had to connect abstract computational algorithms to real-world situations that students could relate to. As this ITA explained:

My way was to relate the theory with the programming style of idea and then telling them "Okay this is what you would have... so this algorithm or this program has this example in the real-world then you can think of it in this practical way. [P3, Interview 2]

In addition to helping students learn the course content, multiple participants described supporting student learning by helping students understand course policies or providing medical and/or personal accommodation to them. For example, one participant discussed allowing a student who was going through a tragic event to resubmit assignments and take exams at a later date.

One of them, for example, lost one of his friends so we had to help him through submission again and all the exam again. [P7, Interview 3]

While participants talked about helping students learn the course material, helping them understand the course policy, and providing accommodation to them in general, one ITA also noted providing additional support to low-performing students in the class. This included sending homework reminders to students or handling late assignments from them. Another participant talked about motivating students who got low grades in exams and assignments to do better in the future.

Regardless of the context or type of support, the process of helping students was dynamic and involved multiple complexities. Several ITAs noted the need to be aware of students' prior knowledge so that they could provide them with appropriate scaffolding. They learned about students' prior understanding of the course content while interacting with them or grading their work. For example, one participant talked about learning about students' prior knowledge while grading:

While grading different students on the homework, it was evident that each of them had different levels of knowledge on the pre requisites. [P3, Weekly Reflection 1]

This insight into students' prior knowledge helped the ITA identify some of the common topics that students were struggling with and accordingly design future instruction to better support their needs.

4.1.4.2 Managing instructional time

As ITAs engaged in helping students learn the course content, they also had to ensure that they were effectively managing the office hours or classroom time. Management of instructional time was done at two levels: 1) managing multiple students seeking help, and 2) covering all the content planned for a class.

Multiple students seeking help. The first aspect of managing instructional time involves simultaneously helping multiple students. Many participants noted situations during lab sessions and office hours when they had to attend to multiple students needing assistance to complete their lab experiments or understand course topics or complete assignments. Participants noted

getting a rush of students, especially before a test or a major assignment. For example, one participant reflected on their experience during the sixth week of the semester:

This week I had a relatively larger number of students during my office hours (because they had a quiz on Wednesday). A lot of students were asking at the same time and some of them were sometimes cutting each other questions off. [P4, Weekly Reflection 5]

In this example, the ITA noted that because of an upcoming quiz, they had a lot of students attend office hours with questions and concerns. This situation required them to manage the office hour time in such a way that helped all the students present and prevented one student from taking most of the office hour time.

Covering planned content. The second aspect of managing instructional time involves ensuring that all the content during a class session is covered, as noted a few times by the two participants who were leading lab sessions. Given the limited amount of class time, they had to ensure that they taught all the materials planned for that session within the stipulated time. As one participant reflected:

For the last computer lab, we (all the TAs) had to teach some parts of the lecture and also review some basics of interpolation before our computer lab slides... Since the total time for the computer lab is 75 minutes, I usually take around 15 minutes going over the computer lab slides. Now, we had to also cover some topics from the lecture, which meant that we had to manage our time carefully." [P6, Weekly Reflection 12]

In this example, the ITA reflected on their experiences of managing the lab time during a week when they had to cover some additional topics from the lecture sessions. In order to teach all the topics planned during the session, the ITA restructured the lab session by modifying the usual course of different lab activities.

4.1.4.3 Managing student behavior

As ITAs engaged in helping students learn the course topics, they experienced both positive and negative student behavior. Positive behavior included students paying attention in class and engaging in the class. Negative behavior consisted of students being distracted in class, showing up to ITAs' offices without an appointment to seek help, sending queries related to an assignment a few hours before the submission deadline, not clearly communicating their

questions over emails, not submitting assignments in time, or not following assignment submission guidelines. Several ITAs noted modifying content and teaching methods such as establishing clear roles and expectations and changing the amount of content covered through lectures to manage negative behavior, as detailed in Section 4.2.1.3. Some ITAs also noted the discomfort they felt when students tried to get the solutions of homework problems from them without trying it on their own. As an ITA noted:

Sometimes the students hopes you to teach them step-by-step and they want me to give them the solution directly. So, this is some kind of embarrassing for me in the office hour time. I do not like to give the solution to the students. [P2, Interview 2]

In this example, the ITA talked about being put in a difficult situation by students when they asked the ITA for answers to homework problems. This difficulty arose due to the fact that on one hand they did not want to refuse help to students but on the other, they believed that helping students by giving answers to assignment problems would not lead to their leaning. To manage such situations, the ITA reminded the students that they were required to attempt the problems on their own instead of asking the GTAs for solutions, and then asked leading questions of the students to help them reach the solution.

4.1.4.4 Managing infrastructure

The final aspect of instructional experiences involves handling infrastructure related issues during class or office hours. Multiple participants described the challenges they faced due to the absence of adequate infrastructure in the classrooms or technology failure during instruction time. For some participants, these issues were one-time problems. For example, one participant noted:

It was not knowing. It was basically the server had crashed. So I did not know what things to do to restart it... as I said its more theoretical, so you tend to know the answers to theoretical questions, unless they are coding assignments which are automatically graded, that's when "Okay, this is not running, okay, you are missing a semicolon" but then on the server that it's running, if that is crashed, then I can't tell. You have to talk to the instructor. [P5, Interview 2]

As can be seen from the example, an Internet failure during office hours prevented the ITA from helping a student find errors in their computer code. Hence the ITA asked the student to contact the instructor to explain the situation and seek help. Similarly, another participant described the

inability to lead a class session the way the ITA had initially planned due to the lack of a projection system in the classroom. As a result, they had to teach using their laptop.

For another ITA, the infrastructural issues were more perpetual. This ITA noted their inability to book a classroom with whiteboards to hold office hours. As a result, they had to meet with students in their graduate student office, which did not have a whiteboard. As a result, they at times faced difficulties in explaining concepts to students.

4.1.5 Workload management experiences

The final category of experiences described by ITAs in this study involves managing their TA workload along with ITAs' own coursework, research, and personal commitments. Like course preparation, this category was not identified by Kuo but rather emerged from the data. The key themes in this category include 1) significant time taken by TA responsibility, 2) completion of TA work in a short time period, 3) managing TA work with other professional commitments, and 4) managing TA work with family and personal responsibilities.

4.1.5.1 Significant time taken by TA responsibility

The first aspect of workload management experiences as described by participants involves the time needed to complete their TA responsibilities. All participants noted the significant time their TA responsibilities took. While some participants had expected their TA work to be time-consuming, for others it came as a surprise - even if they had previous TA experience. As a participant noted:

The major part of the course that I am TA for is the assignment and quizzes. Every session, there is an in-class quiz and almost every week an assignment to submit. The large number of submissions to grade is time-consuming. Thus, sometimes the grading process take longer than I expected (from last year experience I had). [P7, Weekly Reflection 2]

This ITA explained that the course they were teaching had an in-class quiz each class session and an assignment to be completed by students every week. As a TA, they were required to grade all these in-class quizzes and homework assignments, which took up a lot of their time. The participant further added that they were not expecting this level of time commitment for completing their TA job and it came as a surprise to them.

4.1.5.2 Completion of TA work in a short time period

The second aspect of workload management experiences involves completion of TA responsibility in a short time period. Sometimes, participants had to complete their TA responsibility on short notice, which put additional pressure on them. For example, an ITA noted:

Last week, in addition to teaching a lab on Thursday afternoon, I also had to fill in for the instructor on Tuesday for teaching the class... I got to know about this only 4 days before the class which meant I didn't have a lot of time to prepare. [P6, Weekly Reflection 7]

In this example, the ITA talked about substituting for the course instructor for a class period when the instructor was unable to teach. However, the ITA came to know about it only four days in advance, creating a relatively short time period to prepare for the class and leading to a significant increase in their workload during those four days.

Other times when participants' TA responsibility required a quick completion were when tests and quizzes were administered to students. Participants noted an increased number of emails from students before a test or a quiz, and the need to respond to them as soon as possible to provide maximum support to students. Similarly, the end of the semester was particularly stressful because many had to complete their grading work during a short time period so that they could be reviewed and submitted to the University Registrar in time. As one ITA reflected about the last two weeks of the semester:

We got a lot of works these two weeks as grading and we need to finish them in a short time since it is the end of the semester now. [P2, Weekly Reflection 14]

As noted in this quote, the ITA had to ensure that they finished grading all the final exam papers before the grade upload deadline. Since there is a short time gap between the administering of the final exam and uploading the final grades, it considerably increased the participant's TA workload.

4.1.5.3 Managing TA work with other professional commitments

In addition to finishing their TA responsibilities, which sometimes were time-consuming, ITAs also had to complete with their own Graduate School work – courses, research, and

conference travel. Most participants described the tension they faced between completing their TA work and paying attention to their own research and coursework. Handling the commitments of a graduate student required some ITAs to sometimes work for their TA responsibility (such as grading) while being on a trip for a conference or other research activity. One participant also noted having to make up for the work they missed while they were away. As the participant described:

It was challenging because this week was hectic with all due dates for my own coursework assignments and projects. Also, I have to prepare for my presentation at the conference. It was difficult to accommodate another 6 hours [to make up for travel] to my already existing office hours for this week. [P5, Weekly Reflection 12]

In this quote, the ITA discussed how, during a week, they had a lot of deadlines to meet for their graduate coursework. Additionally, they had to prepare for an upcoming conference. This situation was further worsened by the fact that had to hold additional office hours to make for the following week when they were going to be at the conference.

4.1.5.4 Managing TA work with family and personal responsibilities

Besides their graduate work, some participants also needed to respond to their family and other personal commitments. For one participant, these commitments came up when a family member was visiting from their home country. Another needed to visit their home country during a semester to attend a family event:

I had to leave for <home country> on <a date during the semester> because of my brother's wedding which is why I wasn't on campus when the assignments had to be graded. [P6, Weekly Reflection 15]

As discussed in this quote, the participant needed to leave for their home country to attend their brother's wedding. As a result, they had to coordinate with the course instructor and the other TA in the course and complete their grading work from overseas. While the issues involving managing TA work with family and personal responsibilities are also relevant for domestic TAs, these issues become more pronounced for international TAs because of the relatively higher travel time and travel cost involved in traveling from the East Coast to Asia or the Middle East, where all the participants for this study came from.

4.1.6 Summary of ITAs' experiences

The first research question for this study explores how ITAs in this study described their teaching experiences. This section reported the participants' teaching experiences. Participants described their teaching experiences in five areas: English competency, sociocultural, course preparation, instructional, and workload management.

ITAs described both challenges due to and confidence in their English competency skills. As they were required to teach classes in a language that was not native to them, they faced challenges in generally communicating with students because of their English competency. These challenges were due to both their communication proficiency and their different usage of English different from the one used in the US. However, with more teaching experience, they noted an improvement in their communication abilities. On the other hand, there were some participants who discussed their confidence in their English communication skills and how it helped them communicate with help students in an effective way.

As ITAs described their experiences of teaching in a non-native language, they also noted experiencing numerous sociocultural differences in the instructional approaches adopted in US classrooms, instructional content knowledge, student and instructor behavior, and classroom diversity. These differences usually appeared in the final interview when participants holistically reflected on their teaching experiences. While most participants felt that learner-centric US academic environment equipped with better facilities supports student learning, the sociocultural differences were mostly perceived as neutral for ITAs themselves. In addition to differences in teaching and learning practices, some participants' sociocultural experiences also involved interaction with home country students in native language during instructional time. Different ITAs described interacting with home country students in their native language as both beneficial, as it could help the home country students better understand the concepts, and unprofessional, as it could be perceived as differential treatment of students by the ITA.

The next category of experiences, described by most participants, pertain to course preparation. These experiences constituted a major portion of participants' GTA responsibilities. The experiences related to course preparation involve learning or relearning of the course materials and managing the logistics of delivering the content. These experiences appeared quite

frequently in many participants' weekly reflections and were usually described as both challenges and opportunities for learning. In terms of challenges, some participants noted that it took them a lot of time to learn the course material if the content was unfamiliar to them, thus increasing their TA workload. However, at times, learning the content enhanced their own knowledge.

Like course preparation, participants' instructional experiences also constituted a significant portion of many ITAs' teaching experiences. These experiences include providing support to students in terms of learning the course content, helping them understand the course policy, and accommodating for their personal needs. Generally, these experiences were perceived as neutral. In addition, although less frequent, instructional experiences also involved managing classroom time, student behavior, and infrastructure-related issues. Like supporting student learning, managing classroom time and student behavior usually did not pose specific challenges to participants. However, participants faced difficulties in effectively teaching students when they faced infrastructural issues.

The final category of experiences relates to managing of the TA workload in the context of other professional and personal responsibilities. Usually perceived as a challenge, most participants frequently noted that their TA work took a lot of time, putting a lot of stress on them. This was especially true for situations when they had to complete the TA work in relatively short time. This situation was further complicated by the fact that all participants needed to attend to their Graduate School-related commitments, and some had to respond to their family commitments along with their teaching workload.

4.2 ITAs' Navigational strategies

The second research question explores how ITAs navigate their teaching experiences. To address this question, I used *a priori* codes and categories that emerged from my synthesis of the literature on navigational strategies adopted by ITAs (and international instructors). However, the final codes and categories, while guided by prior literature, emerged from the data collected for this study.

As discussed in the last section, ITAs described a variety of ways in which they experienced teaching. To navigate these experiences, they employed a number of strategies. These strategies included modifying the course content and delivery methods; building credibility with students; using workload management strategies; and using support from faculty, peers, and the university support systems. In some cases, participants practiced these strategies during the study period to make their teaching more effective and in other cases, they recommended these strategies based on reflection afterwards. In the following sections, I discuss these strategies in detail with representative quotes for each strategy.

4.2.1 Content and delivery strategies

The first set of strategies the ITAs in this study adopted to navigate their teaching experiences pertains to modifying both the course content and the teaching approaches. These strategies helped ITAs achieve multiple goals including 1) supporting student learning, 2) managing student rush, 3) managing student behavior, 4) addressing communication barriers, and 5) addressing sociocultural differences. Participants adopted various content and delivery strategy to achieve each of these goals. A summary of these strategies corresponding to each goal is provided in Table 4-2.

Table 4-2: Content and delivery strategies used by ITAs

Goal achieved by content and delivery strategy	Strategy used to achieve that goal
Supporting student learning	<ul style="list-style-type: none"> • Making connections with the real-world or relevant concepts • Using multiple examples • Modifying course topics • Providing remedial materials/sessions • Using active learning • Using instructional approaches from home countries
Managing student rush	<ul style="list-style-type: none"> • Distributing time across students • Helping students in groups
Managing student behavior	<ul style="list-style-type: none"> • Establishing/reminding students of roles and expectations • Changing the amount of content covered • Using collaborative learning • Using miscellaneous strategies based on the context
Addressing communication barriers	<ul style="list-style-type: none"> • Using written communication • Continuing to engage with students
Addressing sociocultural differences	<ul style="list-style-type: none"> • Learning about sociocultural differences/US academic environment

4.2.1.1 Supporting student leaning

The first goal that ITAs achieved with content and delivery strategies was to help students better learn the course content. Participants achieved this goal by using a variety of strategies: a) making connections with the real-world or relevant concepts, b) using multiple ways to explain course topics, c) modifying course topics, d) providing remedial materials/sessions, and e) using active learning.

Making connections with the real-world or relevant concepts. Multiple participants frequently talked about using real-world examples to explain abstract and mathematical concepts to students. While the use of real-world examples helped students learn complex concepts, ITAs also believed it was important for their students to learn the meaning behind the numbers instead of getting lost in numerical details. As one participant noted:

It's easy sometimes to forget the meaning behind the numbers and the equations and things like that, so it's also important, I guess this could be one of the advice as well for other TAs is that don't get sucked into the-- just trying to solve the problem. Always try to understand what's the meaning behind the problem... So, yeah, there is always some type of real-world application somehow or implementation. Also try to think behind the numbers and not just focus on solving the question ... because many students just try to figure out, "what does this value mean? What this value mean?" "Okay, I can just use this equation to solve the problem". It's not just about plugging in numbers and "plug and chug" as they say. There's usually more to understand about that. [P4, Interview 2]

In this example, the participant discussed the importance of teaching students the meaning behind the numbers in the textbook problems and the real-life implications of the textbook problems. As evident from the excerpt, the participant not only noted using the strategy of connecting the problems with real life, but also offered this strategy as advice to future ITAs. In a similar vein, some ITAs emphasized moving beyond the immediate problem and connecting it to other concepts or problems in the field to help students realize the relevance of the course materials they are learning.

Using multiple examples. As participants talked about connecting the concepts to real-world or other relevant course topics, a few also frequently noted using multiple examples and connections to do so. As one participant teaching a highly mathematical course noted the strategies to teach the course:

Especially for this course, I would say give more of examples and give more of explanation for each of the concepts. Don't just put a theorem and then assume that they'll understand the statement. Don't just say a proof and assume that they'll understand. Just go through repeated proofs by multiple ways of explaining the same thing ... try and see because one of them will understand in one particular explanation. [P3, Interview 3]

In this example, the participant noted using different examples to explain the same concept as one particular explanation might not be easy for all of the students to understand.

Modifying course topics. Besides using real-world examples and multiple ways of teaching the course concept, some ITAs also sometimes talked about modifying the course content itself to aid student learning. This was done at two levels: adding content and changing the difficulty level of the existing content. As discussed in Section 4.1.4, participants gauged students' prior knowledge while interacting with them or grading their work. Based on this understanding, they sometimes added additional topics to the course or lowered the difficulty level of the next few classes. As a participant noted:

Based on the questions students ask in the office hour and exam result from last semester... I suggested to add some material in the course to improve students' performance and learning in the course. [P7, Weekly Reflection 11]

In this excerpt, the participant discussed their experiences of helping the course instructor develop the content for a class session. As evident from the quote, the ITA suggested topics to be included in the session based on their assessment of student learning through office hour interactions and grading student work. Similarly, another participant noted:

So obviously, we had to [reduce the difficulty level] of the things in the courses. And I think I've mentioned in a few reflections that we actually had to make it a bit easier than the previous or what we are intending to do. We changed few assignments. [P6, Interview 3]

In this example, the ITA reflected on their experiences of reducing the difficult level of the topics covered in the lab sessions and problems on lab assignments. This was done after the teaching team realized during the first few sessions that most students did not have sufficient prior knowledge to solve advanced problems.

Providing remedial materials/sessions. In addition to lowering the difficulty level of the class and modifying course topics to help support student learning, some participants also

suggested providing remedial materials to get students up to speed with the course content. While none of the ITAs noted holding additional help sessions, a few offered this as an advice for the future. As one ITA recounted:

[In the next semester], I would say definitely [hold] tutorials provided the instructor is the same and the instructing method is the same, then I'd suggest [hold] tutorials at the beginning itself because that would have given the people the motivation to get a good grade or some-- I mean you would know the level of the students right at the beginning itself. [P3, Interview 2]

In this example, the participant suggested holding additional tutorial sessions when the ITA could tutor the students on the topics that students struggled with. The ITA further added that these tutorial sessions should be held in the beginning of the semester before students start getting demotivated to learn the content due to their poor performance on the assignments. Another participant noted staying longer after the lab sessions to offer additional support to students who needed it.

Using active learning. While the strategies discussed above helped students better learn the course topics within a particular course, one participant also described the use of active learning strategies to gain skills that could be transferred to the engineering profession in addition to learning the course content. As the ITA, who was teaching a programming course, reflected:

I think changing the format of the class into project-based class would be better. I am not sure it is applicable for this course because they are at the beginner level, but I had the project-based course with <name of a professor> in Computer Science. It was really great because it will add skills of engineering, working as a group team, a group member and also you had to go and learn a lot of stuff yourself and it will expand your insight. I guess it can be, at least put some portion of the grade into a some kind of project-based section. [P7, Interview 3]

In this quote, the ITA suggested using project-based learning to teach the programming concepts using concepts as that will not only help students get a better insight into how to use computer programming to solve practical problems but also teach them professional skills such as teamwork, communication, and self-directed learning.

Using instructional approaches from home countries. As participants tried various strategies related to content and teaching approaches, some also adapted the instructional

approaches they learned as students or teaching assistants or instructors in their home countries for their US classrooms. For example, one ITA talked about teaching programming using a method that they learned during their undergraduate studies. As the ITA noted:

I feel my approach to this lab was something like taking inspiration from what I did in my undergrad was that, if you understand... first is the theoretical part of the <course name>. Then there's the coding part. For the coding part, as long as you know the pseudo code, you can always go to the MATLAB website and ask, "What is the Syntax of if-else?" ... That part, you need to first understand the coding, how that works. As long as you know that, you should not worry about the MATLAB. Then you only have the theory part to [understand]. That is something I think I used to promote that approach instead of just starting with the MATLAB only and then saying, "In MATLAB, you have to do this." No, first understand what the method is going to do, then understand the pseudo code of how you'll execute that, and then just look up on MATLAB if you don't remember. If you remember, then just code that. [P6, Interview 3]

In this example, the participant described teaching the theoretical underpinning of computer programming to students instead of starting off with learning the syntax and writing codes in MATLAB. They noted that students get a deeper understanding of the programming concepts if they have a better grasp of the theory. With this approach, students could transfer their learning of programming to other programming environments.

4.2.1.2 Managing instructional time

The second goal that content and delivery strategies helped ITAs achieve was managing the instructional time. As discussed in Section 4.1.4.2, there were times during labs and office hours when participants had to simultaneously help multiple students. ITAs noted adopting two strategies to achieve this goal: a) distributing time across students, b) helping students in groups.

Distributing time across students. When multiple students needed help during office hours or lab sessions, some participants divided their time across students so that they could help all students. For example, one participant noted keeping track of the order in which students came to office hours so that they could respond to students in the order they arrived:

I tried to keep track of the order students came with and make sure that everybody got a chance to ask at least one question; instead of one student just going on. [P4, Weekly Reflection 5]

By keeping track of the order in which students arrived to the office hour, the participant took turns to address students' questions. This helped the ITA support all students and prevented a few students from taking up the entire office hour time.

Helping students in groups. Besides distributing time across students, several ITAs also noted helping students in groups to manage their instructional time and provide help to as many students as possible. For example, one ITAs noted answering students' queries in groups during office hours if multiple students had the same question. Similarly, another described addressing misconceptions/mistakes common to multiple students in the class using the whiteboard:

Normally at the beginning of the lab or in the middle of the lab, I will write out some solutions for some common mistakes they make. For example, I remember that in lab two or lab three, capacitors needs to be set between the source and the ground so that it helps to get rid of the oscillations issue. It is not clear in the materials that the capacitor should be put as close as the BJT as possible so that it can function better. Most of students, since they do not understand what the materials looking for, so some students just set the capacitor as far away from the BJT. In that case, there will be some oscillation issues. I notice that problem at that class and in the middle of the class... I just write some notes on the whiteboard, and tell them in public they need to put the capacitor as close as the MOSFET as they can so that it can help most of them to solve the issues they are dealing with. [P1, Interview 2]

In this example, the participant described how they warned the entire class of a potential error in the placement of capacitors in an electrical circuit when they realized that the instructions in the lab manual were not very explicit; and a lot of students were committing mistakes in capacitor placement. This strategy saved valuable lab time that would have otherwise been lost if the ITA had helped each student individually.

4.2.1.3 Managing student behavior

The third goal that ITAs achieved using content and delivery strategies was to manage student behavior. As described in Section 4.1.4.3, ITAs experienced various negative student behaviors including students being distracted in class, showing up to ITAs' office without appointment, not following email etiquette, and not following assignment guidelines. ITAs in this study noted using multiple strategies to handle these student behaviors: a) establishing/reminding students of roles and expectations, b) changing the amount of content

covered, c) using collaborative learning, and d) using miscellaneous strategies based on the context.

Establishing/reminding students of roles and expectations. Most participants frequently navigated negative student behaviors such as students trying to get solutions to homework problems or showing up to ITAs' offices to seek help without appointments by either establishing clear roles and/or expectations with students about their visit to office hours or seeking help from ITAs or reminding students of those rules if they were already established. For example, when students tried to get answers from the ITAs, they reminded students that ITAs were not allowed to give answers to students. Rather, they were there to guide students to figure out the solutions on their own. Similarly, when students came to ITAs' offices without appointment to seek help, ITAs reminded them to come during office hours. For example, one ITA recounted:

There are three or four guys I had to actually, literally tell them, that you cannot come at any time... And also, every week, I used to tell them that, "Make sure you send me an email beforehand." It took them some time to understand, but at least three to four guys I had to tell them that you cannot just come like this during-- just before the deadline and expect me to help at any time. [P6, Interview 3]

As implied in the above excerpt, time boundaries played an important role in deciding when ITAs responded to student queries. If students emailed participants or came to their office close to an assignment deadline, they were more reluctant to respond to the students. Also, they were less likely to help students when it would have taken relatively longer to provide support.

Establishing and/or reminding students about roles and expectations also helped participants ensure that students do their assigned work with due attention to guidelines. For example, one ITA described reminding students of the assignments due and submission guidelines ahead of time. The participant also noted sending follow-up emails to students who missed the assignment deadlines.

Changing the amount of content covered. In order to prevent students from losing interest in the class and engaging in side conversations, some participants noted reducing the amount of content to be covered during a class period. For example, a participant described keeping lectures short and providing only the essential details during the lecture. As described in

the excerpt below, they suggested providing additional written materials, if needed, to students to help them learn the details:

In the class, I notice that although I want to include a bunch of information to provide the whole picture of the lab design for those students, few students are able to follow me. The main reason is that during the conversation, people have limited energy to pay attention to different thing. What I learn from this is that the next time I talk with people, I just need to present the most essential part of information to them, rather than draw a whole picture of it via talking. If I want to provide things with detailed, it is better to provide them with written materials. [P1, Weekly Reflection 2]

The participant further noted that they sometimes also increased the pace of the class by covering a lot of new material during the session, which kept students focused on learning the material instead of being distracted.

Using collaborative learning. As discussed in Section 4.2.1.1, one participant suggested project-based learning strategy to help students learn the content better. Another participant noted using active learning strategies to keep students engaged in the class. The ITA modified their teaching strategy after the first lab session by asking students to discuss their mistakes with one another and learn from them.

Using miscellaneous strategies based on the context. Besides establishing clear roles and expectations, changing the amount of content covered, and asking students to learn from one another, one ITA also noted using several strategies based on the context to keep students' attention. These included making their voice louder, tapping on the whiteboard, and asking pop questions of students during class sessions.

4.2.1.4 Addressing communication barriers

The fourth goal that the content and delivery strategies helped participants achieve was addressing communication barriers. As discussed in Section 4.1.1.1, some ITAs in this study noted challenges in listening and speaking. In order to navigate these challenges, they used two strategies: a) continuing to engage with students, and b) using written communication.

Continuing to engage with students. Some participants navigated communication challenges pertaining to listening by continuing to engage with students. They noted that they

asked students to repeat themselves if it was difficult for the ITA to understand what students wanted to convey. As one participant reflected:

They are undergraduate students. Sometimes maybe they speak very quickly to ask some questions so I will ask them to speak again. To speak their questions again for me. [Px, Interview 3]

Use of written communication. To overcome the challenges related to speaking, one ITA also used visuals and other forms of written communication to explain concepts to students if they found it difficult to explain it due to the language barrier. As the ITA recounted:

Sometimes it's hard to explain some difficulties using English because it is not my first language and sometimes you may stuck in some important sentence. At that time, I will use the whiteboards and to use of graphs because we all understand graphs. I will let the graphs to help me to make the explanations more simple and easy to understand. [Px, Interview 3]

In this example, the ITA noted using graphs to explain concepts to students when they found it difficult to use verbal communication due to their lack of fluency in English. They further added that it was easier for them to use graphs as the same or similar graphs are used across the world to explain engineering concepts. Interestingly, this participant also used a chart (Figure 4.1) to better explain some of their experiences during the interview.

4.2.1.5 Addressing sociocultural differences

The fifth goal that participants achieved using content and delivery strategy involved addressing the sociocultural differences in teaching and learning. Unlike the above-discussed goals, which involved participants modifying content and/or teaching approaches, some participants addressed the intercultural issues in teaching and learning by improving their knowledge of the US educational culture. Sometimes, they improved their knowledge of the US educational culture by talking to faculty or fellow graduate students, or using online resources. At other times, they learned about those differences through observation. One participant noted taking explicit steps to learn about the teaching approaches adopted in US classrooms:

The first semester that I was here, I did not know the American education system. I attended first few lectures along with the undergrads to get the feeling like how the instructors teach. [P5, Interview 2]

In the above quote, the ITA noted how they sat in a few classes to learn about the instructional approaches used by instructors in US classrooms when they first started working as a TA at the university.

4.2.2 Credibility-building strategies

The second set of strategies adopted by ITAs center on building rapport with students. Building rapport with students made them more comfortable in interacting with the ITAs leading to a supportive learning environment, eventually leading to student learning. ITAs achieved this goal by 1) using feedback from students to modify teaching, 2) being approachable and transparent with students, and 3) ensuring that they are well-prepared to help students when needed.

4.2.2.1 Showing willingness to help students

Several ITAs noted showing willingness to help students to gain their trust. One way some participants showed willingness to help students learn was by showing patience while working with students and encouraging them when they committed mistakes as a strategy to engage with them. As one participant noted:

In the first lecture and the first experiments, it spends a lot of time for us to explain to them. They also made many mistakes because they need to do lots of new things. I do remember that when I was in the experiment one, when we do the first experiment, nearly 80% of the students cannot finish their experiments on time... At first, it may be hard to imagine that if the students need to spend so much time on each [experiment], they need to put so much extra time on that. But at that time, I think that will be fine because once they figure out how to do that in the first labs and they can do better in the following labs. I also keep encouraging them so that when you're done for first experiment, you'll be fine for the rest of the semester. [P1, Interview 3]

In this example, the ITA described how they showed extensive patience while teaching lab experiments to students. Even when students took a lot of time to finish the lab experiments and committed numerous mistakes while conducting them, the ITA kept encouraging them. This was especially required as students were conducting their first lab experiment and needed to familiarize themselves with the lab equipment and the environment.

Besides being patient with students when they performed poorly, some ITAs also showed willingness to help students even if students, at times, came to their office without appointment.

As one ITA noted:

Like, yesterday that guy, he just came to my office without even asking. But I don't... So I asked once the instructor, he said that it's not your job to keep them explaining if they don't come during office hour. But I don't like doing that. I mean these are the guys I meet every Thursday. I know them personally now. [P6, Interview 2]

In this example, the ITA described that they did not prefer refusing help to students when students come to the ITA's office without prior appointment because the ITA knew them personally and had built a relationship with them through the interactions they had during the weekly lab sessions. Later during the interview, this ITA noted that they usually got more students seeking help from them as compared to other TAs in the course, and cited their flexibility and willingness to work students as a potential reason for getting more students.

4.2.2.2 Ensuring preparedness

As ITAs showed their willingness to help students, they needed to ensure that they are prepared in terms of their own content knowledge. All ITAs in this study talked about the importance of being prepared. As one ITA noted:

Go over the homeworks early, make sure you understand them, try never to put yourself in the situation where you're faced by a question you cannot answer. I mean, definitely, nobody knows everything but there is an extent to which you can say, "I don't know." You cannot always say, "I just don't know." If something is really advanced, then that's fine but if it's something that you should know as a TA then... students are coming to ask you because they expect you to know some certain stuff. [P4, Interview 3]

In this example, the ITA offered advice for future GTAs about the importance of being ready for answering student questions during office hours. While it is acceptable to occasionally not know answers to student questions, especially if the questions are on advanced topics, a repeated inability to answer student questions must be avoided. Students come to office hours expecting support from their GTAs and a lack of preparedness on the GTA's part might lower the GTA's credibility with the student.

4.2.2.3 Being honest about their abilities

While they should be prepared to help students, one ITA also noted that they should be honest about their limitations in terms of their ability to help students. The participant noted how they clearly communicated with students about their inability to verify the solutions to assignment problems as they did not have a rubric.

And I'm very honest with them. I say that this is the first semester and see the instructor is not giving us rubric so I won't know the answers. The things that I know I can help you understand. So they just come to me with conceptual doubts... since I've only made myself clear that I don't have the rubric, I don't have the answers with me, maybe my solution is wrong. [P5, Interview 3]

As noted in this example, the ITA's truthfulness about their inability to check student answers helped students make an informed decision on whether or not they wanted the ITA to verify their answers. Thus, it prevented students from losing points on assignments due to submitting incorrect solutions. Also, it supported their learning as they were now better aware of the support that the ITA could provide them.

4.2.2.4 Using student feedback

In addition to being prepared and showing willingness to help students, some ITAs noted seeking student feedback and implementing it to better support their learning. These ITAs described using student feedback to modify their teaching styles, change the course content, and plan additional help sessions. Sometimes, they got this feedback by conversing with students during class and office hours and learning from them which topics they are struggling with. At other times, they got this feedback from students without explicitly asking them for it. For example, one ITA noted how students give them feedback on the lecture given the ITA:

Sometimes those students tell me that they cannot understand a specific part of the lecture. And sometimes they tell me that this lecture is much better than the one in previous week, so that I can make some change to the lecture according to their comments. [P1, Weekly Reflection 11]

As described by the ITA, the feedback from the student helped the ITA modify their lectures to better support student learning. Besides getting feedback from students during instructional time, another participant noted getting feedback from a student on the assignment sheets submitted by the student.

The feedback that ITAs got from students was not only about their own teaching but, at times, also about how the course instructor taught the class. For example, one participant noted passing on the feedback to the course instructor based on their level of comfort in communicating the feedback to the instructor.

4.2.3 Workload management strategies

The third set of navigational strategies adopted by the ITAs in this study involves using workload management strategies. These strategies particularly helped the participants save time and/or manage their TA workload with their own coursework, research-related travels, and personal commitments. The workload management strategies described by ITAs in this study include: 1) planning, 2) flexibility, and 3) use of time-saving tools.

4.2.3.1 Planning

One of the significant ways all participants managed their time and workload was to plan for their TA and other responsibilities. The first aspect of planning, described by several ITAs, involves preparing for their TA and/or other responsibilities (such as preparing for conferences, conducting research) as early as possible. This freed up their time later to attend to unforeseen situations and other responsibilities. As one participant noted:

My office this week was packed more than usual and a couple of students were communicating with me via e-mails regarding the HW solutions. Also, I had to help with proctoring a quiz they had this week. Adding to the mix the regular research requirements of a graduate student, this was quite a challenge... To avoid such situations in the future I will try to be prepared more early (like maybe 2 weeks in advance or something). [P4, Weekly Reflection 7]

In this example, the ITA described a particularly busy week as a TA when they had numerous students visiting the office hours and some seeking help through emails. Additionally, the ITA was asked by the course instructor to proctor an exam. This additional responsibility combined with their graduate workload made the week very hectic for the participant. To navigate such situations in the future, the participant suggested preparing for the office hours as soon as possible. In the subsequent weekly reflections, the participant noted being prepared for office hours two weeks in advance.

The second aspect of planning, also noted by several participants, involves scheduling time devoted to working on their TA and other responsibilities. For example, one ITA reflected:

What I've done was put the weekend, which is Saturday and Sunday, for mainly the TAship duties which I thought was to be done that time. I learned whatever needs to be known before for the next assignment and whatever should be graded on the weekend. So on weekdays, I work on my own things and weekend work on the TAship duty. [P3, Interview 3]

In this example, the participant described how they allocated time over the weekends to work on their TA responsibilities. The ITA noted preparing for the office hours by reviewing the solutions for the upcoming assignments and completing their grading task during Saturdays and Sundays.

4.2.3.2 Flexibility

In addition to planning for their time and TA work, many participants also frequently noted building flexibility into their plans to manage the TA workload. This flexibility was achieved by adjusting their scheduled when needed. For example, one participant noted moving their schedules if they had to meet a deadline for their TA responsibility:

Basically, I just keep this [priority] list and keep toggling the items in the list. On Wednesday I start putting the items in that I need to grade the sheets. By the time the Sunday comes, it comes on to top priority that I should do it. But on Monday if I have a meeting with my advisor again, put it down and put my meeting with the advisor on the top. Basically it's just by priority management and all. That's how I'm surviving in that [laughs]. [P3, Interview 2]

As discussed in the above example, the participant scheduled grading for Sunday. However, if the participant had something more important on Monday such a meeting with the advisor, they would adjust their schedule to prepare for the meeting on Sunday. In this case, the participant would complete the grading after the advisor meeting on Monday.

Some ITAs also built flexibility into their schedules by using idle times during labs and office hours to work on their TA responsibilities. For example, one ITA noted how they use the time when students are working on their lab experiments to grade lab reports from previous experiments:

I will grade the students' work at the class [during] which I assign them to do the lab. So, when they do the experiments, I will grade their prelab and lab. They need to turn in their prelab before they do the experiments and after the experiments, they will turn in their labs. So, I will grade both of them when they do the experiments, and it is more time efficient because I don't need to wait for them to do the labs. I can do my gradings and if the students have any questions, I will go to their bench and help them. After that, I will go back to my seat and continue grading. [P1, Interview 2]

Another participant noted using the idle time during office hours to prepare for the next week's office hours of finishing the grading work.

4.2.3.3 Use of time-saving tools

Besides planning for their TA workload and building flexibility into their plans, multiple participants often used tools or strategies that saved time while carrying out their TA responsibility. These tools either automated some of their work or helped them complete their work in less time. As one ITA reflected:

Rather than using the conventional IDE for compiling the Python codes, we asked the students to provide their answer in <name of an online platform>. In this way it is possible to upload all the submissions at one place and run the code faster... It was big achievement cause compared to the last year it took much less time to do the grading. [P7, Weekly Reflection 5]

In this example, the ITA described using a particular online platform for students to submit their computer codes. This platform allowed students to submit multiple codes in one place, which helped the ITA grade them faster by simultaneously executing all the codes and spotting errors in them. Some participants noted using their own engineering skills to design computer programs to automate the grading process.

Some participants also suggested setting up exams and quizzes that could be graded using “auto-graders” as a possible tool. Another possible tool noted by ITAs was to give electronic exams so that they could save time in manually entering student scores from student answer sheets to the course management system.

4.2.4 Support utilization strategies

The fourth set of strategies described by ITAs to navigate their teaching experiences is using support from faculty, peers, and the university support systems. Unlike the workload

management strategies that helped ITAs navigate one specific set of experiences, participants noted that they sought support to address a range of concerns including course preparation, managing GTA work with other responsibilities, navigating sociocultural experiences, and improving linguistic skills.

4.2.4.1 Support from faculty

Support from the faculty played a crucial role in successful completion of participants' TA responsibilities. Most participants noted getting support from both the course instructors and the research advisors to effectively complete their TA work. While participants sought faculty advice to navigate a host of experiences, including negative student behavior and sociocultural differences, there were two areas in which participants got support from the faculty on a continual basis: a) course preparation, and b) workload management.

Course preparation. The course instructors helped the participants in course preparation by regularly providing slides, HW solutions, rubrics, or textbooks. Sometimes, the course instructor helped the participants learn the lab procedures and ways to address issues that arise while conducting the lab experiments as described in the excerpt below:

For the supervisor of the class... he wrote and give us some basic introduction of each lab. He wrote into the basic circuits schematics and briefly talk about the things that we need to design in the lab and before the lab and some common mistakes that we may encounters during the lab. At the same time, he taught us how to use the lab equipments and how to solve some practical issues... For example, there are some oscillation due to the parasitic elements in the test board. So he always comes up on useful solutions like to ask us to add a bypass capacitors between the power source and the ground. It's really helpful. [P1, Interview 2]

Workload management. Some participants also noted the support they got from faculty to manage their workload. This support came in the form of flexibility given by the course instructor to move office hours or take extra time to grade assignments as valuable support, especially when they had to travel for conferences and/or personal commitments. At other times, the instructors shared the ITA's workload to help them finish their task. As a participant reflected:

We are 3 GTA's in the course, and all grading needed to be completed in a closed room. The final exam had 10 questions and most were lengthy answers. It was mostly

theoretical and the answers had to be read completely in order to search for keywords... The 2 instructors helped us in completion of the grading process in the process described above so that there were 5 graders instead of 3. [P5, Weekly Reflection 15]

In this example, the ITA described the support given by the course instructors to complete the grading of the final exam before the grade submission deadline. The participant noted that the course instructors and the GTAs in the course divided the grading work among themselves, which helped the GTAs complete grading in time.

Besides getting support from the course instructor, one participant also described the support they got from their research advisor in completing their TA work. The participant noted that their research advisor relaxed research-related requirements for the ITA during the times of high teaching workload so that they could meet their GTA responsibility. Another participant reflected that their research advisor (who was also the course instructor) shared some of participant's TA responsibility when the TA work demanded a relatively large amount of time so that the ITA could focus on their research.

4.2.4.2 Support from peers

Besides support from the faculty, several ITAs also relied on peer (fellow TAs and graduate students) support to complete their GTA responsibility. Support from the peers helped participants in course preparation, managing instructional time, managing TA responsibility with other personal and professional commitments, and navigating the TA experience in general.

ITAs frequently noted the support they got from fellow TAs with course preparation in terms of designing lab sessions, learning/re-learning of the course content, and implementing effective grading plans. Some participants also noted referring students to fellow GTAs and UTAs during office hours to manage a large number of students seeking help. Participants also used support from fellow GTAs when they were traveling for professional or personal reasons. For example, one participant described seeking a fellow GTA's support in getting a substitute for office hours when they were out of town for conference travel:

A co-GTA helped me in shifting her office hours to the time when I had cancelled mine [because of my conference travels]. That helped such that no students were left unattended. [P5, Weekly Reflection 9]

Although not very often, some participants also turned to fellow graduate students who had served as TAs in the past for support in handling various aspects of their teaching assignment. This support usually came in the form of advice on how to professionally engage with students or navigate the TA experience in general. For example, one participant reflected:

But last year I had two students- they just came to the office and started talk <native language>. I tried to answer them in English, because my friend told me that it is not something professional to just speak in different language with other student as the student from your own country in your own language. [Px, Interview 2]

In this excerpt, the ITA described the advice they got from a previous TA in the course how to professionally engage with students who have the same native language as the ITA during office hours. The ITA was advised not to use their native language as it may be seen as unprofessional with differential treatment being given to the home country students.

4.2.4.3 Support from the university

In addition to the support from faculty and peers, many ITAs also cited the support they got from the university and academic departments. Most of this support came in the form of mandatory training for the GTAs. Some participants noted learning about university codes of conduct and academic honesty from these training sessions. One participant noted learning valuable workload management strategies from previous TAs during these sessions.

However, none of the participants except one talked about using the various support systems made available by the university to help GTAs effectively perform their duties. The participant noted using the writing center on campus to learn report-writing skills. On probing further, they cited a lack of awareness of other training programs for GTAs to improve English competency as a reason for not using other support services to improve their communicative proficiency.

4.2.5 Summary of navigational strategies

This section reported the findings for the second research question, which explores the various strategies ITAs in this study utilized to navigate their teaching experiences. Participants adopted a range of strategies that could be categorized as course content and delivery strategies,

credibility-building strategies, workload management strategies, and support-utilization strategies.

Modifying course content and teaching methods were the most significant strategies used by the ITAs in this study to navigate their teaching experiences. Noted by all the participants, these strategies were used for two purposes: 1) supporting student learning, and 2) navigating the challenging aspects of teaching such as managing student rush during instructional time, managing negative student behavior, addressing communication barriers, and addressing sociocultural differences in teaching and learning between their home countries and the US. Table 4-2 lists the various content and delivery strategies used by participants and maps them to the goals these strategies helped participants achieve. While the strategies used to support student learning evolved as participants gained more teaching experiences and engaged in self-reflection, the ones adopted to navigate the challenging aspects of teaching were generally adopted in response to a difficulty faced by participants in conducting their TA responsibility.

As ITAs engaged in adopting various content and delivery methods to support student learning, several also employed strategies to build credibility with students, leading to a comfortable and supportive learning environment for students. The ITAs built credibility with students by showing willingness to help, ensuring they are prepared to help, acknowledging any limitation in their ability to providing help, and being open to and using feedback and critique from students to support student learning. However, at times, participants experienced tension between showing willingness to help students and managing negative student behavior by establishing clear rules. For example, when students came to ITAs' offices without appointment to get help on assignments, some ITAs found it difficult to refuse help to students because of the rapport that they had already built with the students.

As participants put significant time and energy in helping students learn the course and effectively fulfilling their TA work, all employed various strategies to manage their TA workload with other professional and personal responsibilities. These strategies include planning for their TA and other responsibilities, incorporating flexibility in their plans to attend to urgent situations, and using tools that helped them save time required to complete their teaching work. Workload management strategies required participants to not only use their managerial skills

such as effective planning but also engineering skills such as writing computer codes that grade student work.

While participants adopted various strategies to navigate their teaching experiences, they also heavily relied on support from faculty, peers, and the university support system. They used the available support for course preparation, managing their workload, and navigating linguistic and sociocultural differences. In fact, support from faculty and peers was directly related with ITAs' ability to effectively fulfill their TA responsibilities. Supportive course instructors and fellow TAs helped ITAs better prepare for the course content in terms of both learning or relearning of the course material and/or designing or modifying the existing material. Similarly, supportive instructors and TAs helped participants manage their workload by sharing participants' workload when participants had to attend to research or personal commitments.

4.3 Influence of ITAs' social identities on their experiences

The third research question looks into the influence of ITAs' social identities on their teaching experiences. There were the two aspects of ITAs' identities that significantly influenced their experiences: 1) international identity and 2) GTA (as opposed to being an instructor) identity. These two aspects were explicitly described by several participants as continually shaping their teaching and interactions with students. Additionally, there were several instances where the intersections between these identities and participants' teaching experiences were implicit in their description of experiences. In the following sections, I discuss in detail how these two aspects influenced participants' experiences.

4.3.1 Influence of participants' international identity on teaching experiences

ITAs' international identity played a significant role in shaping their experiences. ITAs cross national and cultural boundaries when they arrive in the US. While working as teaching assistants at US universities, they have to navigate cultural and linguistic differences in teaching and learning. As a result, ITAs have unique experiences of teaching in US classrooms. ITAs in this study described three areas in which their international identity influenced their experiences: 1) English competency experiences and related navigational strategy, 2) sociocultural experiences and related navigational strategies, and 3) interaction with international students. While the first two areas have been described in detail in earlier sections, a more in-depth

discussion of how ITAs’ international identity influenced their interaction with international students – an additional theme that addresses the third research question - is done below. Table 4-3 summarizes these experiences and navigational strategies, relevant themes in each category, and the section where these themes are discussed in detail. The table also notes whether participants explicitly commented on the intersection of their international identity with these experiences or these were implicit in participants’ experiences.

Table 4-3: Intersection of ITAs’ international identity with their teaching experiences

Experience/Navigational strategy	Theme relevant to the identity	Explicit/Implicit	Section where discussed in detail
English competency experiences/navigational strategies	Problems due to communication proficiency (listening and speaking)	Explicit	4.1.1.1
	Problems due to using different English dialects/pronunciation	Explicit	4.1.1.2
	Continuing to engage with students, use of written communication	Implicit	4.2.1.4
Sociocultural experiences/navigational strategies	Experiencing differences in educational practices (instructional environment, content knowledge, student and instructor behavior, classroom diversity)	Explicit	4.1.2.1
	Linguistic experiences in native language	Implicit	4.1.2.2
	Use of pedagogical skills from home countries	Explicit	4.2.1.1
	Learning about sociocultural differences in teaching and learning	Explicit	4.2.1.5
Instructional	Interaction with international students	Explicit	4.1.2.2, 4.3.1.3

4.3.1.1 English competency experiences

The first area where participants’ international identity intersected with their experiences is related to their English competency. As English was not their first language, some participants noted difficulties in listening and speaking. Additionally, some participants also noted difficulties due to different English dialects or pronunciations used in the US. A detailed discussion of these experiences with sample quotations is described above in Sections 4.1.1.1 and 4.1.1.2. These challenges required ITAs to use strategies such as continuing to engage with

students when they faced a difficulty in communication and use of visual/communication. These strategies are discussed in detail in Section 4.2.1.4. Note that in some cases, the intersection between particular English competency experiences and participants' international identity was explicit when they talked about speaking and hearing English or highlighted specific differences in English dialects. In other cases, it was implicit when they noted using extensive amounts of written communication to overcome the language barrier.

4.3.1.2 Sociocultural experiences

The second area of intersection of participants' experiences with their international identity involved their sociocultural experiences. As discussed in Section 4.1.2 with sample quotations, several participants noted experiencing multiple differences in the educational cultures in their home countries and the US. These differences were in terms of the instructional environment, content knowledge, student and instructor behavior, and classroom diversity. In addition to perceiving these differences, participants also discussed experiences related to the use of their native language during the instructional time. As described in Section 4.2.1.5 with representative quotations, some participants navigated the differences in educational cultures by learning about the US education system. Some also noted adapting and implementing the pedagogical skills learned from their home countries to better support student learning. Similar to English competency experiences, the intersection between ITAs' sociocultural experiences and international identity was explicit in some cases when they explicitly highlighted differences in the educational cultures between their home countries and the US. This intersection was implicit in ITAs' description of the use of native language as coming from countries where English is not the dominant language; all participants could speak at least one other language.

4.3.1.3 Interaction with international students

The third aspect in which participants' international identity influenced their experiences was in terms of their interaction with international students, something several participants discussed explicitly. This involved interactions with international students in general and those from participants' home countries in particular. Talking about interaction with other international students in general, one participant reflected:

Being an international student, I kind of understand if someone else is an international student, I know what troubles they go through in a country that's not their own country and how they are perceived. This is for only people who are from some other country than America... Basically, the familiarity of someone being an international student gives them a little more interest in an international TA so that they can talk to them. Both of them are not constrained about the English they talk about. They are not constrained about the way they've used the words and how they should talk according to here or something. I think that brings up little more similarity between all the people, apart from who are coming into this country than who are in this country. [P3, Interview 3]

In this instance, the participant noted that the experiences of being in a foreign country brought them closer to other international students as they both had experienced the shared difficulties of living in a foreign culture and navigated the attitudes of perceptions of domestic individuals toward them. They also described how they realized their increased closeness to international students as they noted that their international identity also made it easier for an international student to converse with them without being conscious of using incorrect or non-standard English.

In a similar vein, another ITA noted that their international status helps students from their home country to learn the course better as they can discuss the course topics with the ITA in their native language, leading to a better understanding of the course due to the lack of the language barrier.

Interviewee: As an international GTA, maybe only good for the <home country> students [laughs] in that class.

Interviewer: How do you think it was good for the <home country> students?

Interviewee: Sometimes, they may like to speak <home country language> if there is no other people. [Px, Interview 3]

However, contrary to this, another ITA saw a shared native language with students from their home country as a disadvantage. They noted that some students started talking with them in their native language during the office hours. The ITA found this unprofessional and noted that they might be perceived as favoring students from their home country over other students (see Section 4.1.2.2). Hence, they asked the students to stop talking in their native language and use English.

4.3.2 Influence of GTA identity on ITAs' teaching experiences

In addition to their international identity, participants' GTA identity also shaped their teaching experiences. There were two areas in which they had unique experiences because of their status as a GTA as compared to the instructor. These were: 1) instructional experiences, and 2) workload management experiences. A summary of participants' experiences that were influenced by their GTA identity is present in Table 4-4 along with an indication of whether these influences were explicitly noted by them or were implicit in their description of experiences. The sections where these intersections are discussed in detail are also indicated in the table.

Table 4-4: Intersection of ITAs' GTA identity with their teaching experiences

Experience/Navigational strategy category	Theme relevant to the identity	Explicit/Implicit	Section where discussed in detail
Instructional experiences	Perceived expertise in the course content/teaching skills	Explicit	4.3.2.1
	Responsibility for the course and student learning	Explicit	4.3.2.1
	Access to resources	Explicit	4.3.2.1
	Relatedness to students	Explicit	4.3.2.1
Workload management experiences	Management of Graduate School work with GTA responsibility	Explicit	4.1.5.3

4.3.2.1 Instructional experiences

The first area where participants' GTA identity intersected with their teaching experiences relates to their instructional experiences. Participants' GTA identity influenced their instructional experiences at four levels: a) expertise in the course content and/or teaching skills, b) responsibility for the course and student learning, c) relatedness to students, and d) access to resources. These intersections were explicitly noted by the participants while discussing how their teaching experiences were different from those of course instructors.

Perceived expertise in the course content and/or teaching skills. The first aspect in which participants' GTA identity influenced their instructional experiences involves their expertise in the course content and/or teaching skills. Some participants noted that they believed

the instructor had more expertise in the course content because they had conducted research in the same area for a long time. One other participant noted that because of the instructor's experience of teaching the same content for a while, they had a better understanding of which topics the students pay more attention to and which ones they don't. As the participant reflected:

Instructor-- because they maybe have taught these things in the class, maybe they might do a bit better, because they know what students... what is the part they rush through and what is the part they actually spend a lot of time and those things. [P6, Interview 3]

This ITA believed that the instructors are in a better position to guide the students and point out areas where students need to pay more attention to get a deeper understanding of the course.

While a lower level of course expertise posed a difficulty for the participants, one participant also noted the strengths they had in terms of their understanding of the course content. Although the instructor had a better understanding of the content and more teaching experience with the same content, the ITA had a more immediate understanding of the content as they had more recently conducted the experiments and/or solved the assignment problems. The ITA recounted:

[GTAs] can talk sort of... I think we discuss more efficiently because when we do the experiments... when we prepare the experiments before the lab, we made the same mistakes that the students made in the class. We know more about what the students are thinking at that time. [P1, Interview 3]

In this example, the participant noted that they have a practical understanding of using the lab equipment as they have done the lab experiments before students. As a result, they were more aware (as compared to the course instructor who has a theoretical expertise in the course content) of where students may commit mistakes while doing the experiments based on their own understanding of conducting them.

Responsibility for the course and student learning. The second aspect in which participants' GTA identity influenced their experiences is the level of responsibility they felt toward the course and student learning. Some participants noted that they had relatively less workload and lower responsibility toward student learning, which was seen as both an advantage and a disadvantage by different ITAs. In terms of advantage, one participant noted that they were

not responsible for making difficult decisions related to the course and student learning, which significantly eased their workload.

Harsh decision like... if someone said that my hand was broken and he doesn't have a doctor's prescription or something, then we just forward those mails to our instructor. Then they take the harsh decision whether the assignment can be submitted after due date or something like that. In this semester, I did not have any case of cheating or something but if there are case of cheating, then they take the harsh decision whether there should be some strict actions taken or something like that. It's always the instructors who take the final decision which you may or may not like. [P5, Interview 3]

In this excerpt, the ITA noted that it is the instructor's responsibility to make decisions about providing accommodation to students in case of a medical issue or reporting a student to the Honor Court if they were found cheating. As the ITA is relieved of making these decisions for the students, it makes their TA job less stressful.

A lower responsibility toward student learning also meant that the participants could distance themselves from students' poor performance in the course. As one ITA reflected:

If I was the professor, I would have been much more disappointed that my course is not giving lot of motivation to the people and my assignments are not inspiring them or rather they're not able to get excited about the course. So I would be a little disappointed and worried that I couldn't impart that kind of interest in them or make them do it much more nicely. [P3, Interview 3]

In this quote, the ITA reflected on students' low performance and lack of motivation toward the course. The ITA noted that they would have been hugely disappointed if they were the professor and unable to spark student interest in the course. However, as a GTA, they felt that they weren't as responsible for poor student grades and sparking student interest in the course.

However, one participant described a lower responsibility toward the course and student learning as a disadvantage. The participant described a lower level of autonomy in making course decisions as limiting in that it hindered their growth as a future academic. The participant noted that they had to get the instructor approval before responding to students' queries and adjusting student grades based on grade review requests. This hierarchy prevented them from independently grow as a teacher.

Relatedness to students. The third aspect in which participants' GTA identity influenced their experiences is their relatedness to students. One participant reflected that because of their shared experiences of being students, undergraduate students could better relate to the ITAs. As a result, the students felt more comfortable in seeking help from the ITAs, leading to a better learning of the course. As the participant noted:

On the other hand, as a TA since we are all students, it helps to communicate with each other. Sometimes for some students it is kind of nervous to talk with the professor. Some students may be afraid of making mistakes before their supervisors. And as for talking with TAs, the environment is more friendly and less stress. Yeah, so... they can ask if they have any questions. [P1, Interview 2]

In the above excerpt, the participant noted that students feel more comfortable and less stressed communicating with the TAs. Hence students can easily ask questions of the TAs. At the same time, students feel more comfortable making mistakes in front of the TAs as compared to the instructors. This allows students to try out new ideas and ways of solving a problem and, at times, attempt a problem if they are unsure of the ways to approach it. This comfort in communication, along with the enhanced freedom to commit mistakes, furthers student learning.

Access to resources. The fourth aspect in which participants' GTA identity influenced their experiences is in terms of access to resources required for teaching. Although described by only one ITA, not having enough access to the required infrastructure hindered them from effectively carrying out their TA responsibility. As the ITA reflected:

If I am a instructor, not a TA, I may -- maybe I will arrange a classroom to have the students. But now in my office, I can't write down. I don't have board. I mean if I may use instructor, I may reserve a classroom and to hold the office hours there. [P2, Interview 3]

In this example, the participant talked about how it was difficult for them to reserve a classroom to conduct office hours. Hence, they had to meet with students in their office. However, as the ITA's office did not have a board, it posed challenges for them at times to effectively explain concepts to students or explain the same concepts to multiple students.

4.3.2.2 Workload management experiences

The second area where the participants' GTA identity intersected with their teaching experiences was the management of their teaching workload with their graduate school

responsibilities such as coursework and research. As explicitly noted by several participants and discussed in detail in Section 4.1.5.3 with examples, managing two set of professional responsibilities made it more challenging for the ITAs to meet their deadlines and goals, particularly during crucial times of the semester such as the semester end when they had relatively shorter deadlines to meet for both their TA work and own coursework. Some participants also expressed that, at times, their research work suffered due to the significant amount of time taken by their TA responsibilities.

4.3.3 Summary of influence of ITAs' identities on their experiences

This section reported the findings of the third research question. The third research question explores how ITAs' social identities influence their teaching experiences. ITAs in this study noted two aspects of their identity influencing their teaching experiences – the international identity and the GTA identity. Participants experienced both challenges and advantages due to these identities.

Participants' international identity influenced their teaching experiences in terms of their linguistic, sociocultural, and instructional experiences. Multiple participants noted facing challenges related to listening and speaking in English due to a lack of prior exposure to the language. At the same time, most ITAs experienced multiple differences in the teaching and learning practices adopted in the US as compared to their home countries. While participants perceived these differences to be neutral, being educated in a different culture afforded them the advantage of using pedagogical practices from their home countries to support student learning. In addition to linguistic experiences in English, ITAs' international identity also led to linguistic experiences in their native language with home country students, which different participants found both beneficial for student learning and unprofessional for being seen as preferential treatment given to home country students. Besides the use of the native language to better explain the content to home country students, some participants also noted the advantage that their foreignness afforded them in supporting international students in their classes. Being international brought ITAs closer to international students, leading to ease in conversation and better learning for international students.

Participants' GTA identity shaped their teaching experiences in terms of their instructional and workload management experiences. Participants described both instructional advantages and challenges due to their GTA identity. These instructional advantages and challenges were noted in terms of expertise in the course, course responsibility, relatedness to students, and access to resources. While some perceived to have lower expertise in the course content as compared to the instructor, they noted having an immediate understanding of the assignments and lab procedures. Similarly, some noted having a lower responsibility for the course and student learning, which eased their work but did not give them enough experience to prepare them well for the role of a future academic. Like their international identity, participants' GTA identity also brought some of them closer to students, leading to a more supportive environment for students. However, being a GTA also meant a lower access to resources. As one participant noted, this lower access to infrastructural resources prevented them from effectively completing their GTA work. In terms of workload management experiences, handling the responsibilities of a graduate student along with TA work made it challenging for them to manage two different sets of deadlines and goals. Several participants noted that their research work was suffering due to the significant amount of time they had to devote to their GTA work.

4.4 Cross-case analysis

The first three research questions explore the experiences of ITAs, the navigational strategies they adopted, and the influence of their social identities on their experiences. The fourth question aims to compare the experiences of participants and explore similarities and differences across their experiences. To that end, I performed a cross-case analysis of ITAs' experiences. As discussed in Chapter 3, I used a multiple-case study methodology with seven ITAs to conduct this study. Each ITA in this study was treated as a case. A cross-case analysis was performed to synthesize the findings across cases. It allowed me to explore the similarities and differences across ITAs' experiences and highlight the potential reasons that may have led to those experiences (Yin, 2009). This comparative analysis is particularly important in light of the intersectional framework guiding the study because it draws attention to variations in ITAs' experiences. Based on the cross-case analysis, I found three major areas in which variations were observed in participants' experiences: the following sections discuss these variations and point out potential factors that may have led to the observed patterns in ITAs' experiences.

4.4.1 English competency experiences

The first area in which variations were observed in ITAs' experiences is related to their English competency relative to participants' home country. As can be seen from Table 4-5, participants experienced notable variations in their experiences due to their proficiency in English. These experiences ranged from difficulties in listening and speaking English to problems due to use of different English dialects to confidence in English communication abilities.

Table 4-5: Variations in participants' English competency experiences

Nationality	Prior exposure to English	Communication problems	Navigational strategy	Confidence in communication ability	Improvement in communication skills during study period
<i>China</i>	In English classes during K-12 and college	<i>Problems in listening and/or speaking, problems due to different English dialects</i>	<i>Use of written communication, continued engagement with students</i>	None noted	Improvement in how to effectively communicate course topics
<i>China</i>	In English classes during K-12 and college	<i>Problems in listening and/or speaking</i>	<i>Use of written communication, continued engagement with students</i>	None noted	None noted
Egypt	During K-12, language of instruction was English	None noted	NA	None noted	None noted
India	During K-12 and university, language of instruction was English; during job after undergraduate	Anticipated communication problems with students who do not understand English well	None noted	Communicating the course concept never an issue if they know the concept	None noted
India	During K-12 and university, language of instruction was English	Problems due to different English dialects (in the initial semesters as TA)	None noted	Communication skills help explain concepts to students	None noted
India	In English classes until K-12; during university, language of instruction was English	Problems in communicating ideas/concepts	None noted	None noted	Improvement in how to effectively communicate course topics
Iran	During K-12 and university, language of instruction was English	None noted	NA	None noted	Improvement in how to interact with students

Notes: 1) Participants' IDs and genders have been removed from this table to prevent their identification.

2) Some cells have been italicized in the table to highlight patterns.

In terms of confidence in communication skills, one participant even noted that their communication ability helped them effectively explain concepts to students.

The most significant experience was when a girl came during my Friday office hours and sat there solving the assignment which is due on Monday. She had a tough time initially because she had forgotten most of her linear algebra. But then we both went about the question step by step and then she grew in confidence and went on to solve most of the parts on her own...My communication skills and also the quality to perceive what the person sitting opposite to you is thinking, helps in this experience. [Px, Weekly Reflection 1]

In this quote, the ITA noted that because of their communication skills and ability to perceive whether the listener has understood them, they were able to help the student who came for help during office hours.

While participants expressed concerns and confidence about their communication abilities, it should be noted that these abilities were not static. Several participants noted that they improved their ability to communicate with students through their TA experience. While some learned various expressions that are used in their discipline, others learned ways to make the course content easy to understand for a diverse set of students with different understandings of the course content. As one participant reflected:

I feel that, especially that 20 minutes first where I teach things, that's something that I learn a lot from there in terms of, not just the subject knowledge, but also how to make an audience which might not know about things... like there's no uniformity in terms of their understanding in the crowd. Some people know. So like I mentioned, there are ten... I know some nine to 10 guys who have actually done the assignment, they are done with the lab, but they'll still come there just to learn from those 20 minutes or something... Then there are a few guys who have no clue, there are a few guys who know a few stuff. So it's like how to balance those 20 minutes for all the crowd there... That's the same that you have in any presentation that your crowd, they are all not at the same level. It's very rare that you get everybody with the same amount of knowledge, but you still have to cater and make it interesting for all of them. So that's something I learn and improve every time. Every Thursday is a new chance for improvement for me. [Px, Interview 2]

As described in this example, the participant noted that the experience of teaching students during the class helps them improve their communication skills. While some of the students in the class have a firm grip of the course material, others struggle with basics. As the ITA has to make the presentation interesting and informative for students at varied level of expertise with

the content, it makes them reflect on ways to reach out to an audience with a diverse skill-set, eventually improving their own communication skills.

Patterns in ITAs' communication ability. While there were observable differences in ITAs' communication abilities, there were also some notable national patterns in terms of their experiences. However, it should be noted that the participant pool for this study was not large enough to make any claims about ITAs' linguistic abilities by nationality; instead, these patterns point to the need for further exploration. As can be seen from Table 4-5, the two ITAs who described challenges in listening and/or speaking were both from China (shown in *italics* in the table). Moreover, these were the only two participants in the study whose only exposure to the English language was in the form of English language classes they took during their K-12 and undergraduate. The other five participants had more exposure to the English language as it was the primary language of instruction in some or most of their education, or a primary medium of communication in their job post undergraduate. As can be seen from the table, these participants did not note any English communication challenges related to listening and speaking. Rather, the challenges described by some of these five ITAs pertained to the use of different English dialects or accents, or general communication.

Like the similarities noted in Chinese ITAs' communication challenges, there were patterns observed in their navigational strategies to overcome these challenges. Both Chinese participants noted using written communication instead of verbal and continually engaging with students in case of a communication problem due to their listening or speaking ability. The other five, who did not describe any challenges related to listening or speaking, did not note using this strategy to navigate their English language related experiences.

4.4.2 Experiences related to interactions with students

The second area in which variations were observed in ITAs' experiences concerns their interaction with students relative to participants' self-identified gender. Participants discussed these experiences at three levels: a) power distance between student and instructor, b) negative student behavior, and c) linguistic experiences in native language. These experiences are summarized in Table 4-6. As can be noted from the table, not all participants noted experiences with respect to interaction with students, but the patterns observed across the participants who

discussed these experiences are significant and noteworthy. As noted earlier, given the small number of participants in this study, these preliminary patterns simply point to the need for further exploration rather than lead to conclusive claims.

Table 4-6: Variations in participants’ sociocultural experiences

Gender	Power distance between student and instructor	Negative student behavior	Linguistic experiences in native language
<i>Female</i>	<i>Experienced lower power distance- could not compel student to attend classes or be punctual to the class</i>	<ul style="list-style-type: none"> • Students showing up without appointment • Students trying to get answers 	Ability to talk to home country students in native language as benefit
<i>Female</i>	<i>Experienced lower power distance- had to be careful about not offending students</i>	<ul style="list-style-type: none"> • Students not following assignment guidelines • Students showing up without appointment • Student trying to get answers 	Talking to home country students in native language unprofessional
Male	None noted	<ul style="list-style-type: none"> • Students being distracted in class 	None noted
Male	None noted	<ul style="list-style-type: none"> • Students not following email etiquettes • Students showing up without appointment • Students trying to get answers 	None noted
Male	None noted	None noted	None noted
Male	None noted	None noted	None noted
Male	None noted	None noted	None noted

Note: Some cells have been italicized in the table to highlight patterns.

4.4.2.1 Power distance between student and instructor

As can be seen in Table 4-6, only two participants discussed their experiences in terms of power difference between students and instructors (shown in *italics* in table). Both of these participants identified themselves as females. As discussed in detail in Section 4.1.2.1, they noted a lower level of power distance between students in the US and their home countries. This lower power distance prevented them from compelling students to attend classes and to be punctual to the class. This low level of power distance also made them monitor their own conversations with students to avoid offending any student. Interestingly, male participants from the same home country did not note experiencing a lower power distance with students.

4.4.2.2 Negative student behavior

Variations were also observed in how ITAs' perceived students' negative behavior. Not all participants noted experiencing negative student behavior, but out of those who experienced it, observable patterns could be identified. As can be seen from Table 4-6, three out of four participants who described negative student behavior noted students showing up to their office without appointment or not following email etiquettes. Two out of these three ITAs are females.

4.4.2.3 Linguistic experiences in native language

Similar to ITAs' experiences of power distance, there were gender patterns observed in their experiences of using native language with home country students. Only the two female participants noted experiences in their native language with home country students (as shown in Table 4-6). However, there were variations in their beliefs about the usage of the native language. While one believed that it helps students from the home country easily interact with the ITA, leading to a better learning of the course, the other perceived the use of native language during instructional time as unprofessional as it may lead others to think that the home country students are being given preferential treatment by the ITA. None of the male participants talked about native language use, and the two females who did discuss it were from different countries.

4.4.3 Prior engagement with the course content

The third area of differences in the participants' experiences involves their prior engagement with the course material. Unlike the last two sections that described variations in participants' experiences, this section discusses variations in a factor, prior engagement with the course content, that lead to variations in participants' experiences. Participants noted varied levels of prior engagement with the course material. Some of them had taught the same course before either as a TA or an Instructor of Record. Some, even if they had not taught the course before, had deep understanding of the content as their research work was on similar topics as the course. Finally, some others were familiar with the course topics as they had taken the same or similar course during their undergraduate studies in their home country. ITAs' prior engagement with the course content influenced 1) the effort they needed to put in course preparation, and 2) their ability to support student learning in the course. Table 4-7 presents these variations along with the related teaching experiences.

Table 4-7: Variations in participants’ prior engagement with the course content and related experiences

Prior engagement with the course content	Course preparation effort	Ability to support student learning
Taught the same course before, course connected with research	Need less work to put in to learn/relearn as the course in the same research area	Aware of the course topic, and knows which concepts to stress while explaining students
Taught the same course before	Could use strategies to save course preparation time based on the previous teaching experience	Could easily identify areas where students had misconceptions and accordingly guide them
Taught the same course before	None noted	Aware of the course topics – could preempt student pitfalls and warn them
Course topics connected with research	None noted	Aware of the course topics – finds it interesting to think of/solve HW problems
Took as an undergraduate	Simple course content, fairly aware of the course content, so does not need to put a lot of effort in learning it	None noted
Took as an undergraduate	Simple course content, but if taught the same class again, less time to learn/relearn course material	None noted
Took as an undergraduate	If taught the same class again, less time to learn/relearn course material	If taught again, better equipped to answer student queries
Took as an undergraduate	Takes a lot of time to prepare/learn the content – especially during the first few weeks of the semester	None noted

Note: The participant P6 was a TA for two different classes. Hence there are eight rows in this table – one for each of the two courses taught by P6.

4.4.3.1 Course preparation time and workload management

As discussed in Section 4.1.3.1, learning or re-learning of the course content constituted a significant portion of participants’ course preparation and teaching experiences. However, the effort required to learn or re-learn course content depended on their familiarity with and understanding of the content.

Not surprisingly, participants' prior teaching experience with the course they were teaching greatly determined their knowledge and understanding of the course topics and hence impacted the time they had to spend on preparation of the material. Those who had taught the course before had to spend significantly less time on course preparation as compared to those who had not. Those who had not taught the course before reflected that if they were to teach the same course again, it would take them significantly less time to prepare for the course. As a participant recounted:

I mean, if it's the same course again, then I wouldn't need as much time to prepare, probably the homework problems are not going to be the same but at least I now have a more clear understanding of the content itself, so it wouldn't take me as much time to prepare for the homework. [P4, Interview 3]

In this excerpt, the participant noted that if they taught the same course again, it would save them a lot of time spent on preparing for office hours, which they do by solving the assignment problems. Even if the assignments for the course changed in the following semesters, it would still take them less time for course preparation as they would already be familiar with the course topics and they would have to spend relatively less time to understand the homework problems and solve them.

In addition to prior teaching experience with the course, the course's relevance to participants' research area also determined the effort they had to put in to learn the course material. If the course topics aligned with the research interests of the participant, they had to invest significantly less time to learn/re-learn the course topics as compared to the situations when their research interests diverged with the course they were teaching. On the other hand, ITAs had to spend a large amount of time in course preparation if they were serving as a GTA for a course for the first time and the course did not align with their research.

Besides prior teaching experience with the same course and alignment of the course with the participants' research, the complexity of the course topics determined the effort ITAs had to put in for course preparation. A course with relatively simpler concepts took less time to prepare. As an ITA who was teaching a relatively simple course noted:

I took <course name> before as an undergraduate but I just didn't have the chance to reuse it or refresh my memory with it again, so as soon as I read the textbook, I mostly

remembered most of the stuff and even the stuff that I didn't necessarily took before or don't remember, it wasn't that complicated. It wasn't much of a challenge. [P4, Interview 3]

As discussed in this excerpt, the participant described how it did not take them a lot of time to prepare for the course taught by them despite having no exposure to the content through prior teaching experience or research. This was because the course topics were simple and easy to understand and did not require a lot of time to learn even if they had not learned those topics during their undergraduate.

4.4.3.2 Ability to support students

Just as ITAs' prior exposure to the course content reduced their course preparation time, it also improved their ability to support student learning. Prior teaching experience with the same course helped the ITA learn which course topics needed to be emphasized to help student learning. For example, a participant described how their prior experience as an "Instructor of Record" for the course noted that teaching the course before helped them understand the course topics that are important for student learning and need to be stressed:

And another thing is that I know [pause]... I know the structure of this course. I know which knowledge is important, and which is trivial. So sometimes I may explain more on a one point, and I will tell the students why this is important and there are something will be related with this point later in this course. [P2, Interview 2]

Likewise, participants noted that their prior teaching experience with the same course enabled them to better gauge students' misconceptions and provide the necessary help to them.

In a similar vein, alignment of the course topic with participants' research areas made them more interested in teaching the course, leading to a higher level of engagement in helping students learn. As one ITA noted:

Like I told I have been working on this in the area related to this. It's one of the parts of our area so I know the course well but I have not taught this [course] anywhere.... Fairly the course would have been tough if I had no experience in that but the good thing [is] I was doing the research in that area so I find it interesting to think of the questions [from the assignment sheets], so I can't call it a challenge at this time. [P3, Interview 2]

In this excerpt, the participant described how since the course they taught was connected to their research, and hence it was more engaging for them to think about the assignment problems. As a

result, even though they had not taught this course before, it did not pose a challenge to them. Rather, knowledge of the course content through research helped them come up with ways to explain the topics to students in multiple ways that students could relate to.

4.4.4 Engagement with the teaching team

The fourth area of variation in ITAs' teaching experiences involves their engagement with their teaching team, which comprised the instructor(s) and/or fellow graduate and/or undergraduate teaching assistants. A high engagement with the teaching team involved regular interaction between the ITA and other members of the teaching team about different aspects of teaching while a low engagement denoted minimal to no interaction with the teaching team. Like participants' prior engagement with the course content, their engagement with the teaching team also represents a factor that led to variations in their experiences. Participants' engagement with their teaching teams influenced their experiences in three areas: a) course preparation, b) supporting student learning, and c) workload management. In general, a higher level of engagement with the teaching team helped participants navigate these experiences of their TA job and a lower level of engagement with the team hindered them in effectively fulfilling their TA responsibilities. Table 4-8 summarizes participants' engagement with their teaching teams and how it influenced their experiences. A detailed discussion of how support from faculty and peers helped ITAs in course preparation and workload management appears in Section 4.2.4. Hence, the paragraph below details how a lack of engagement with the teaching team hindered participants' ability to support student learning.

Table 4-8: Variations in participants’ prior engagement with the teaching team and related experiences

Engagement with the teaching team	Major teaching responsibilities	Influence of the teaching team on participants’ teaching experiences
High	Instructing the lab, Grading	Helped the participant learn course concepts, the use of lab equipment
High	Grading, Holding office hours	Helped the participant learn course concepts, find substitutes when traveling, complete grading by making rubrics; instructors shared grading work when needed
High	Holding office hours, Instructing lab	Helped the participant prepare for the course in terms of preparing slides, tests etc.; Offered advice on how to teach the course content to help students learn
High	Grading, Holding office hours	Student got advice on how to better support student learning and manage negative student behavior; Instructor also responded to student queries when the TA had a lot of queries
Low	Grading, Holding office hours	Participant felt it took longer to respond to students when they needed the instructor’s advice
Low	Grading, Holding office hours	Participant could not convey student feedback about the course to the instructor as they did not feel comfortable doing so
Low	Holding office hours	None noted
Low	Making assignments, Grading	Participant was allowed flexibility in grading during their travels

Note: The participant P6 was a TA for two different classes. Hence there are eight rows in this table – one for each of the two courses taught by P6.

Supporting student learning. As discussed in Section 4.2.4, ITAs noted receiving support from the instructional team in the form of advice on how to better teach the course content or help students with issues related to the course policy such as accommodation and late submissions. However, participants with relatively low engagement with their instructional team noted how it hindered their ability to help students. Because of a lack of interaction with the course instructor, they could not convey the student feedback they informally gathered during the office hours to the instructor. Similarly, a lack of engagement with the instructor at times delayed ITAs’ response to student queries when the ITA needed the instructor’s advice on how to respond to a particular query. As one participant noted:

We didn't meet usually. We just send email if there are some questions we need to solve. We just send emails. If to improve it better ... there should be more communication or meeting with the instructor... I believe this could solve the problems much more efficiently than sent by email. Sometimes the students may ask questions on their re-grading for one question. Maybe it is graded by the other TA, it is wrong. I think we could give him or her some credits there. I need to ask for the instructor's suggestion whether I could or not. If I can communicate with her directly to talk about it, maybe it will be much more efficient to solve this kind of problem. If I just send email, it may take time to get the feedback from the instructor. [P2, Interview 3]

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

4.4.5 Summary of cross-case analysis

This section presented the results of a cross-case analysis on participants' experiences to answer the fourth research question for this study. The results suggest variations and patterns in participants in terms of participants' English competency experiences, experiences related to interaction with students, prior engagement with the course content, and engagement with the teaching team.

With respect to English competency, participants noted both challenges and confidence with their English communication skills. However, while challenges in general communication and due to the use of different English dialects were noted by participants from different countries, one pattern that was observed from the data was that only Chinese ITAs in the study noted challenges in listening and/or speaking. Although not conclusive due to the small number of participant in this study, this pattern suggests the need for further research.

In terms of interaction with students, participants noted a relatively lower level of power distance between student and teacher as compared to their home country. However, only female

participants described these experiences. While not conclusive, this gender-related pattern also points to the need for further exploration. Additionally, participants' noted variations in their perception of the appropriateness of the use of their native language during instructional time. While one considered using native language during instruction to be useful for student learning, another found it unprofessional as it could be perceived as a differential treatment being given to home country students.

In addition to variations in participants' experiences in terms of English competency and interaction with students, there were variations observed in two factors that shaped ITAs' experiences - prior engagement with the course content and level of engagement with the teaching team. Significant amount of prior engagement with the course content through research or teaching led to a deeper understanding of the course content for ITAs. This in turn reduced the amount of work they had to put in to prepare for their GTA responsibility. Similarly, the presence of a supportive instructional team came as a boon to the participants in terms of course preparation, effectively fulfilling instructional responsibilities, and managing teaching with travel and other engagement. On the other hand, a lack of interaction with the teaching team hindered ITAs' ability to effectively support student learning.

4.5 Summary of results

This chapter discussed the results of this multiple-case study aimed at exploring the experiences of ITAs in US engineering classrooms, navigational strategies adopted by them, and influence of their social identities on their experiences. The first section of this chapter explored the teaching experiences of ITAs in US engineering classrooms. Based on the thematic analysis of the data, it was found that ITAs' experiences could be grouped into five categories: English competency, sociocultural, course preparation, instructional, and workload management.

The second section discussed the analysis of strategies used by ITAs to navigate their experiences. ITAs use four major categories of strategies to navigate their teaching experiences. These categories include content and delivery strategies, credibility-building (with students) strategies, workload management strategies, and support utilization strategies.

The third section analyzed the influence of ITAs' social identities on their experiences. Participants noted the influence of their international and GTA identities in shaping their teaching experiences. While ITAs have to navigate intercultural differences in teaching when they cross national boundaries, they also bring valuable pedagogical skills that aid student learning. Also, participants noted that their GTA identity brings them closer to students but they have less responsibility for student learning and success as compared to the course instructors due to their role as GTAs.

The fourth and last section discussed the similarities and differences across ITAs' experiences and the factors that influenced their experiences. It was found that variations were observed in participants' experiences in the following four areas: English competency experiences, experiences related to interaction with students, prior engagement with the course content, and level of engagement with the teaching team. While not conclusive, results suggest that Chinese participants faced challenges with listening and speaking in English due to minimal prior exposure to the language, and female participants experienced a lower power distance between students and teacher and a higher level of negative student behavior. Results of the cross-case analysis also indicate that, in general, a higher level of prior engagement with the course content and a greater engagement with the instructional team eased ITAs' teaching experiences.

While this chapter reported the results of the study, the next chapter situates these results within the theoretical framework of intersectionality and explores the issues of power and privilege as experienced by ITAs in this study. The next chapter also discusses how these results resonate with or deviate from the existing work on ITA experience, and highlights the contribution that this study makes to the body of knowledge on ITAs.

Chapter 5: Discussion and Implications

The last chapter reported the findings of this study and shed light on the ways ITAs describe their teaching experiences, and navigational strategies, as well as the ways social identities influence their experiences, within and across the participants in this study. This chapter discusses these findings against the backdrop of the theoretical framework of intersectionality and the current literature on ITAs' experiences. Intersectionality incorporates the influence of multiple social and contextual factors and gives a complex picture of people's lived experiences in a way that invites social and cultural critique. Hence intersectionality provides a powerful lens to interpret my participants' experiences in a way that sheds lights on the issues of power and privileges ITAs experience due to their social identities. Additionally, this chapter explicates the contribution this study makes to the current literature, implications for practices, and directions for future research.

The first section of this chapter highlights the contributions of this study in broadening our understanding of ITAs' experiences. The second section interprets the findings using the theoretical lens of intersectionality in the context of prior research, and critically discusses the intersection of participants' experiences with their social, cultural, and disciplinary identities. The third section notes some implications for practice for engineering departments and universities, faculty, and ITAs in light of the findings of this study. The final section discusses the limitations of this research and points to some avenues for future work that can build on this research.

5.1 Contributions to the current literature

This research explores the experiences and navigational strategies of ITAs in a way that takes into account the disciplinary nuances and invites social and cultural critique. To this end, the findings of this study not only expand our understanding of ITAs' experiences by building on prior literature but also deepen our understanding using a novel framework, intersectionality, to highlight issues of power and privilege that ITAs face due to their social, cultural, and disciplinary identities.

The first significant contribution that this research makes is expanding our understanding of engineering ITAs' experiences and navigational strategies from a critical perspective by

highlighting the influence of ITAs’ social identities on their teaching experiences. Table 5-1 shows the categories that emerged from the data to describe ITAs’ experiences, navigational strategies, and the influence of their social identities on their experiences. In addition to listing the emergent categories, the table also notes the aspects of ITAs’ experiences in the prior literature that were missing from the collected data. The following sections discuss these categories in detail and notes possible reasons for the missing aspects of ITAs’ experiences.

Table 5-1: Emergent categories to describe ITAs’ experiences

Aspect of ITAs’ experiences	Categories based on data	Missing aspects (as compared to the existing literature on experiences of ITAs/international instructors)
ITAs’ teaching experiences (RQ1)	English competency experiences	Use of different English dialects as a pedagogical tool
	Sociocultural experiences	
	Course preparation experiences	
	Instructional experiences	
	Workload management experiences	
Navigational strategies adopted by ITAs (RQ2)	Content and delivery strategies	Change in identity
	Credibility-building strategies	
	Workload management strategies	
	Support utilization strategies	
Influence of ITAs’ social identities on their teaching experiences (RQ3)	International identity	Influence of race and gender on ITAs’ teaching experiences
	GTA identity	

5.1.1 ITAs’ teaching experiences

To analyze ITAs’ experience, *a priori* categories based on Kuo’s (2002) description of challenges faced by ITAs and *a priori* codes drawn from the existing literature were used as initial codes and categories. These codes and categories were modified based on the data. Based on data analysis, it was found that the four categories of challenges developed by Kuo – linguistic, cultural, instructional, and classroom management - are somewhat relevant to the ITAs in this study, but required adaptation and expansion to fully capture their experiences.

Out of these four categories, the nomenclature of two categories was modified: “linguistic” and “cultural”. While the linguistic category was relevant to describe the experiences of ITAs in this study, this category to “English competency experiences” to focus on ITAs’ ability to communicate with their students in contrast to other linguistic issues that were sociocultural in nature. Similarly, the category called “cultural” was renamed to “sociocultural” to include experiences related to ITAs’ social settings such as classroom diversity and use of native language.

Two categories identified by Kuo – “instructional” and “classroom management” were combined and the new category was renamed “instructional”. This was done as both these categories relate to ITAs’ ability to help students learn and manage different issues that came up in the process. The reason for keeping the category’s name as “instructional” was that ITAs had many of the experiences in this category outside the class.

Besides the four initial categories, identified by Kuo, the two new categories emerged from the data. These were “course preparation” and “workload management”. Course preparation experiences relate to learning/re-learning of the course content and handling the logistics of teaching a course. Workload management experiences include managing personal (such as family and friends) and professional (such as coursework, research, conference travel) responsibilities along with their GTA work. The workload management category highlights the intersection of their roles as a GTA and a graduate student, and the various power relations ITAs are a part of because of their intersectional roles.

Missing aspects in ITAs’ teaching experiences. While participants in this study described a range of experiences, none of the ITAs described the use of different English dialects as a pedagogical strength, as discussed in Section 5.1.1.1. This may be due to a lower self-perception of their abilities due to their non-native-English-speaking status (Wang, 2016). Additionally, while one participant described a hypothetical situation involving cheating during a test and their inability to intervene due to a lower power distance between students and instructors in the US classroom, none of the participants discussed an actual experience involving academic dishonesty. While it is possible that there weren’t any instances of academic misconduct in the classes taught by the participants in terms of cheating on assignments or tests, ITAs may also have committed a mistake in identifying cases of cheating or plagiarism while

grading student work or giving feedback to students. The latter is particularly relevant for the ITAs in this study as many of them came from collectivist cultures where extensive collaboration on assignments is an accepted practice. Prior work (Hayes & Introna, 2005; Lax, 2002) suggests that academic cultures vary in terms of what is considered academic dishonesty and plagiarism.

5.1.2 ITAs' navigational strategies

While there were prior systematic studies to explore ITAs' experiences, earlier understanding of navigational strategies adopted by ITAs and international instructors was mostly based on their autobiographical accounts. As Atkinson and Delamont (2006) note, individual stories do not give complete truths about individual's experiences. Rather, they give individual interpretation of those experiences, which are embedded in organizational contexts. While the data collected for this research provides individual narratives of ITAs' experiences, the study uses theoretical (intersectionality) and methodological (multiple-case study) frameworks to systematically understand ITAs' navigational strategies. Additionally, sampling the participants to represent variations in gender, nationality, teaching responsibilities, and the level of class taught allow for the findings to be relevant to a large number of participants. Moreover, the institutional characteristics of the research site in terms of student demographics and institutional focus make the findings transferable to ITAs in several US universities with a high international student population. However, acknowledging the intersectional view that suggests that ITAs' experiences vary across universities and hence cannot be straightforwardly transferred, I have discussed these institutional characteristics in detail in Section 3.2 to allow the readers to determine the extent to which the findings of this study can be transferred to ITAs in a different institutional context.

A priori codes and categories developed from a synthesis of the literature were used to analyze ITAs' navigational strategies. The *a priori* categories included working on pedagogical skills, seeking help from peers, course supervisors, or university support systems, engaging and establishing rapport with students, working on improving language and communication skills, and undergoing a change in identity. While these *a priori* categories provided a starting point, they were modified and expanded during analysis such that the final categories capture the ITAs' strategies as represented in the data.

Missing aspects in ITAs' navigational strategies. Based on the data collected, it was found that participants used most of the navigational strategies noted in the literature except undergoing a change in their identity as noted in Table 5-1. There are two possible reasons for the absence of this navigational strategy: 1) the protocol did not explicitly inquire how ITAs' identities shifted during the course of the study, and 2) given the study was done during ITAs' initial years of teaching in the US, they may not have reflected enough on how their identities have shifted over time.

5.1.3 Adoption of a critical stance on ITAs' experiences

Moving beyond the nuanced categorization of engineering ITAs' experiences and navigational strategies, my research responds to calls from scholars to take a critical perspective on ITAs' experiences (Santini et al., 2011; Yep, 2014). As discussed in detail in Section 5.2, this study engages with ITAs' experiences in a critical way in that it highlights the issues of power and privilege that ITAs face in the US academy due to their social identities on their teaching experiences, and brings to the forefront both the benefits that ITAs bring to the US classrooms and the challenges that they face while teaching in a different educational culture.

Missing aspects in influence of social identities on ITAs' teaching experiences. While participants noted the influence of their international and GTA identities, none of them cited their other identities such as race and gender influencing their experiences. This is where the findings of this study depart from the existing literature that suggests that social factors such as race, ethnicity, and gender influence international instructors' (or TAs') teaching experiences (Chen, 2014; Mohanty, 2011; Mutua, 2014). One possible reason for the absence of these social identities in participants' description of factors influencing their teaching experiences may be their belief that their social identities are irrelevant to their experiences (Markus, 2010). It is also possible that participants were unaware of their own racial identity as many came from homogeneous backgrounds in terms of race and did not have experiences in their home countries that could be attributed of their race (Nguyen, Agrawal, & Grafsky, 2017).

5.2 Understanding ITAs' experiences from an intersectional lens

As reported in Chapter 4, ITAs noted two aspects of their identity that significantly intersected with their teaching experiences – international identity and GTA identity. This

section starts with a discussion of the intersection of ITAs' experiences with these identities in light of prior literature, using an intersectional lens. While a nuanced categorization of ITAs' experiences and navigational strategies helps us gain an in-depth understanding of ITAs' experiences, intersectionality allows us to move beyond these categorizations to consider ways in which the issues of power and privilege operate in the US academy, and thus highlights the complexity and variations in ITAs' experiences. After that, this section critically analyzes the role of the context, engineering, in nuancing the issues of power and privilege for ITAs in this study. Finally, this section discusses some navigational strategies ITAs adopted that did not directly intersect with either their international or GTA identities, or the context of engineering but nevertheless are important to understand the role played by ITAs in the US academy, and better engage them in the process of undergraduate engineering education. While I acknowledge that ITAs' experiences are a result of a complex intersection of their identities instead of an addition of experiences of due to various identities, the following sections separately discuss the intersection of participants' experiences with international and GTA identities to highlight issues of power and privilege. Hence, wherever applicable, I have highlighted the complexity in ITAs' experiences due to their intersecting identities in these sections.

5.2.1 Intersection of ITAs' experiences with their international identity

As the term "international teaching assistants" suggests, the international aspect of participants' identity played a key role in shaping their teaching experiences. There were two aspects of ITAs' experiences in which the intersection with their international identity emerged as the most salient, including those related to their English competency and sociocultural differences in teaching and learning. The intersection of ITAs' international identity point to the complexity of ITAs' experiences, and the multiple issues of power and privilege that lead to advantages and disadvantages experienced by ITAs. This section discusses these complexities in detail, as well as highlights the points where ITAs' international identity intersected with other identities. This section also uses Hofstede's (2001) cultural dimensions – individualism, power distance, and uncertainty avoidance – whenever applicable, to get a more in-depth understanding of intersection of ITAs' international identity with their teaching experiences.

5.2.1.1 English competency experiences

The first area in which participants' international identity influenced their experiences involved their competency with English. ITAs' English competency is something that is noticed first and has been a primary reason for their negative portrayal in the US academy (Fitch & Morgan, 2003; Gravois, 2005) and ITAs' own self-perception of their teaching abilities (Wang, 2016). However, among the ITAs in this study, the issues of power and privilege related to English competency were complex in that different participants noted both privileges, and a lack of linguistic power due to their linguistic abilities.

As discussed in Section 4.4.1, participants noted both challenges due to and confidence in their communication skills. With respect to communication challenges, some participants noted difficulty in listening and speaking in English while others expressed challenges they faced in communicating course content to students. The lack of linguistic power for ITAs due to challenges in listening and speaking can be attributed to their non-native-English-speaking status (Bauer, 1996). The challenges faced by participants in listening and speaking further support the findings of Arshavskaya (2015) who has highlighted the challenges faced by ITAs in understanding US undergraduate students and explaining course content to them.

It should be noted that this lack of linguistic power points to the intersection of ITAs' prior educational background and cultural identity with their international status. The two participants who described challenges in listening and speaking came from a culture in which English was not a medium of instruction or communication. Hence, they were exposed to English only as a course during their education. This finding suggests that ITAs' educational backgrounds and cultures may determine how much they have been exposed to English, which in turn may influence their competency in listening and speaking the language. Hence, ITAs who have had relatively higher exposure to English hold higher amount of linguistic power than those who have not.

However, participants' difficulties with general communication cannot be straightforwardly attributed to their non-native-English-speaking status. Rather, they point to a double loss of power that ITAs experience due to the intersection of their international and novice teacher identities. While the participants in this study were non-native English speakers,

they were also learning to communicate with students in a classroom setting as instructors. As Jenkins (2000) notes, communication issues are a concern with not only international GTAs but also domestic ones. They are just accentuated in case of international GTAs who are more susceptible to cultural misunderstandings. This is particularly exemplified by the experiences of a participant who noted having misunderstandings with students due to different ways of responding to question tags (See Section 4.1.1.2).

While participants experienced a lack of linguistic power, the ITA experience also created privilege for them by providing an avenue to improve their English competency. As participants navigated their experiences of engaging and communicating with students, especially in a non-native language, they honed their communication skills. Multiple participants noted an increased ability to effectively communicate the course content toward the end of the semester when the study was conducted. This finding is consistent with Park (2002) who notes that the GTA experience helps graduate students acquire valuable skills such as public speaking.

In addition to the participants who noted a lack of linguistic power in terms of communication challenges, there were others who expressed linguistic privilege in terms of their ability to communicate with students and explain the course material. One participant even described how their communication skills were crucial in explaining content to students, particularly the ones who were already struggling with the course, as the ITA could gauge students' understanding while interacting with them and accordingly teach the material. This ability to use their communication abilities to better support student learning counters the negative portrayal of ITAs in the US academy that views ITAs as lacking in English competency (Fitch & Morgan, 2003; Gravois, 2005).

As discussed above, participants experienced both privilege and a lack of it due to their communication abilities. This variation in participants' communication abilities is also in sync with one of the basic principles of intersectionality that suggests that there are variations in individuals' experiences within any identity category (Smooth, 2010). Also, this variation highlights the intersection of ITAs' international identity with their specific national identities, thus disrupting the idea of the international identity being monolithic. As discussed in Section 4.4.1, there were variations in ITAs' English competency experiences based on their national identities in that only Chinese participants experienced difficulties in listening and speaking. On

the other hand, some Indian participants noted confidence in their communication skills. This variation in ITAs' experiences with English can be explained on the basis of their prior exposure to the language with participants with minimal prior exposure to English experiencing challenges while those with extensive exposure to the language experiencing privileges. There are many countries where English is used extensively for everyday communication along with the local languages. For example, due to its colonial past, in India English is used both as a mode of instruction in K-12 and higher education, and a medium of official and informal communication. The language has not only persisted in people's lives after decolonization but evolved with the inclusion of local words and phrases giving rise to what is called "Indian English" (Tharoor, 2018). On the other hand, English is taught only as a single isolated language class in some countries like China. Hence, it is more likely that ITAs from countries like India will experience linguistic privilege as compared to those from countries like China where English is not used for communication on a day-to-day basis.

Language and missed opportunity for ITAs. Notably, participants' linguistic experiences, as discussed above, point to a source of privilege involving ITAs' use of different English dialects that was not realized by the participants. While some participants noted challenges they experienced due to their use of different English expressions or accents, none of the participants saw or used different English dialects as a pedagogical tool that can help students develop intercultural competence. Given the importance of developing intercultural competence in an increasingly global marketplace (Johri & Jesiek, 2014), Pae (2001) has previously emphasized using different ways of speaking and writing English as a pedagogical tool to enhance students' "global understanding of issues such as language variety and multiculturalism" (p. 74). Mutua (2014) notes achieving this goal by introducing students to the differences in British and American Englishes. This missed potential privilege of ITAs could be attributed to their international identity or foreignness. As scholars have previously argued, foreignness could mask international ITAs' and instructors' self-perception of their linguistic, cultural, and pedagogical skills (Mutua, 2014; Wang, 2016). Similarly, ITAs' GTA identity could also have prevented them from using their knowledge of different English dialects as a privilege due to their lack of power as a GTA.

5.2.1.2 Sociocultural experiences

Similar to experiences related to communication in English, participants also noted a variety of sociocultural experiences in terms of the differences in the educational practices adopted in the US as compared to their home countries. As discussed in Section, 4.1.2, these differences were noted by ITAs in terms of educational environment, content knowledge, student and instructor behavior, and classroom diversity. While many of these differences can also be experienced by domestic GTAs if they move from a rural university to an urban one or an R1 university to a teaching focused one or vice versa, these differences were more pronounced for ITAs because of the added layer of national differences in academic cultures. Like participants' English competency experiences, their sociocultural experiences point to numerous complexities, issues of power and privilege, and variation across ITAs' experiences, as discussed in the following paragraphs. Also, as discussed below, many of these experiences align with Hofstede's (2001) arguments about educational cultures across the world on three of the cultural dimensions, namely individualism, uncertainty avoidance, and power distance.

Educational environment. The first area of sociocultural difference involves the differences in the educational environment. In general, participants found the US educational environment to be more individualistic, better-resourced, and more structured than in their home countries. Some participants noted the presence of smaller classrooms in the US that allows instructors to give more individualized attention to students, denoting a higher level of individualism in the educational environment (Hofstede, 2001). In addition to the individualized attention that support student learning, participants also noted the presence of better equipment in the labs and well-equipped libraries in the US. Although the ITAs in this study represent only four countries, which provides a limited context for comparison, a higher level of investment in these resources to support student learning points to the economic power that the US holds, leading to an increased ability to put higher investment in higher education as compared to other countries. Finally, participants described a more structured approach to teaching courses in that students are given a course syllabus at the start of the semester listing all the course topics and assignments on a weekly or daily basis, which implies higher uncertainty avoidance in the US educational environment (Hofstede, 2001).

Content knowledge. The second area of sociocultural differences pertains to content knowledge. Participants noted a fair amount of similarity in the academic content taught in undergraduate classes in their home countries and the US, which functioned as a privilege for them as they did not have to put significantly more efforts to learn the content. The shared knowledge of the course content across national boundaries points to a consensus between engineering educators across nations in terms of the content to be taught. This consensus over course content is typical of hard disciplines from which engineering derives its roots (Biglan, 1973; Stark, 1998). This similarity in the content also suggests that ITAs have the required content knowledge through their undergraduate education to teach at US universities, which counters the negative portrayal of as lacking in the knowledge of the course content (Sachs et al., 2011).

This disciplinary consistency is not absolute, however. While participants described similarities in the course topics, they did note differences in the focus of course topics and the level of complexity of problems given to students as assignments. Some participants noted a lack of theoretical underpinning in the engineering curricula in the US while others described the curricula to be focused on helping students solve simple textbook problems without much stress on the application of knowledge to complex real-world problems. These differences in the engineering curricula across nations highlight the ways in which engineering practice – and hence teaching and learning of engineering – is situated within national contexts. National values and histories determine the value placed on various aspects of engineering such as practical value, attention to details (i.e., precision), and theoretical grounding in engineering curricula. For example, the engineering profession in the US emphasizes drawing boundary around the problems, the one in the UK values practical knowledge to solve engineering problems; the one in Germany places high value on precision; and the one in France values grounding the engineering problem solving in theoretical derivations from the first principles (Downey et al., 2006; Downey & Lucena, 2004, 2005).

These studies further point to the added privilege that ITAs have due to their knowledge of the differences in the nature of engineering curricula and different teaching approaches, acquired during their undergraduate studies. Some participants in this study used their power as GTAs to shape teaching by employing teaching practices from their home countries to help

students gain a deeper understanding of the course topics. With a knowledge of the diverse ways of teaching and more robust theoretical and practical grounding, they could use teaching approaches that they thought would lead to a better learning experience for students. The knowledge of and ability to use a diverse set of teaching practices to help student learning highlights the pedagogical strength brought by some ITAs in US classrooms, thus countering the negative portrayal of ITAs as lacking in pedagogical skills (Yep, 2014).

Student and instructor behavior. The third area of sociocultural differences involves student and instructor behavior. Participants noted a lower power distance between students and instructors and a relatively higher amount of agency given to the students in the academic setting. This lower power distance simultaneously created and erased privilege for participants. In terms of creating privilege, a lower power distance led to a more interactive learning environment with students more actively engaged in the process of learning. However, at the same time, a higher amount of student agency erased participants' privilege as it prevented participants from compelling students to attend classes and asking students to be punctual to classes. Also, it required ITAs to monitor their own behavior so that they did not unknowingly offend students. This lower power distance between students and teachers has been previously highlighted by Hofstede (2001) who characterizes the US educational environment as one with extensive student-teacher interaction and a more equal student-teacher relationship.

However, this experience of low power distance cannot straightforwardly be attributed to differences in educational cultures, and points to a complex intersection of gender, educational cultures, and ITAs' teaching experiences. As discussed in Section 4.4.2.1, the two ITAs who noted a lower level of power distance were both females. Although the small number of female participants in the study prevents from making conclusive claims, these experiences of female ITAs in the study may be linked to the lower societal power that women have as compared to men. While both male and female teachers hold the same amount of power as an instructor in front of a student, students may assume a lower power distance with female teachers due to their gender, further pointing to the intersection of multiple identities in the ITA space.

This finding is also in sync with earlier work on international faculty and female faculty of color in the US highlighting the issues of sexism, racism, and xenophobia. For example, in a study aimed to understand the experiences of women faculty of color, Turner (2002) found that

participants felt that students were more likely to challenge their authority and question their expertise as compared to their White male counterparts. Echoing similar sentiments, Johnson-Bailey and Lee (2005) note how students assumed a higher level of authority over them and, at one time, one student even questioned their credentials by asking to see their vita before agreeing to being taught by them. Similarly, Banks (1998) describes how as a Black professor, she does not fit students' image of a "typical" professor and hence does not get the same respect from students as compared to her White male counterparts.

While issues of discrimination among faculty based on gender or race are present in various other countries, the findings from this study do not necessarily speak to these issues across the world as the data for this study were collected at a US university and intersectionality suggests that findings from one geographical context cannot be transferred to another (Smooth, 2010). The way sexism, racism, xenophobia, or other similar issues manifest in the society depend on national and cultural contexts (Mitchell, 2013). Hence, the way female faculty experience sexism, racism, or xenophobia in higher education institutions may vary across countries.

The fact that only female participants noted experiencing a lower power distance between students and instructor may also suggest that they were more sensitized to recognizing the experiences of power distance as compared to their male counterpart during their prior educational or teaching experiences in their home countries. As discussed in chapter 3, Dewey's notion of the continuity of experiences suggests that the past experiences shape the present and the future experiences (Clandinin & Rosiek, 2007). For example, someone who had experienced a societal lack of power while growing up may be more sensitive to recognizing power differentials in a social setting. Hence, it is possible that the female participants had experienced significantly lower power due to their gender or class or ethnicity or other identities in their home countries before coming to the US. However, further exploration needs to be done to understand the exact nature of this power differential and how it manifested in participants' lives, leading to their specific experiences related to power distance as captured in this study.

In addition to experiencing a lower level of power distance, several participants noted negative student behavior, which can also be attributed to the complex intersection of participants' international and GTA identities within an educational environment characterized

by lower power distance. ITAs in this study noted handling negative student behavior in the form of students not paying attention in class, not following email etiquettes, coming to ITAs' offices without appointment, trying to get solutions of homework problems from ITAs without putting in genuine efforts to solve them, and not following assignment guidelines. These experiences resonate with those of ITAs in previous studies (Arshavskaya, 2015; Bresnahan & Cai, 2000; Trebing, 2007) in that ITAs in prior studies have also noted student behavior that they found unprofessional and inappropriate. It is possible that the ITAs in this study, due to their foreignness, may have experienced a higher level of student misbehavior as compared to their domestic counterpart as suggested by Alberts, Hazen and Theorbald (2010). Similarly, participants may have experienced more student misbehaviors due to their decreased power as students. Also, a lower power distance in the US classrooms may have made undergraduate students feel empowered to engage in some of the negative and unprofessional behaviors. However, the data collected in this study are not sufficient to support these comparative claims because the participant pool only consisted of international GTAs at a single US university.

Classroom diversity. The fourth area of sociocultural differences involves classroom diversity. Participants in this study described experiencing classroom diversity in terms of the presence of students from different countries, which is quite unlike their own countries where the student population is quite homogeneous in terms of the nationalities represented. The presence of international students in class had two implications for the ITAs. First, ITAs noted a higher level of comfort felt by international undergraduate students in interacting with them due to a shared international identity, which was seen as a privilege by the participants. This shared international identity helped them build credibility with other international students, leading to a more supportive environment for student learning.

Second, the presence of international students in the class also opened up possibilities of communicating in their native language with home country students, which different ITAs perceived as both privilege and disadvantage, thus highlighting the complex variations in ITAs' experiences. One ITA, who considered the possibility of communicating with students in their native language to be a privilege, believed that using their native language in the classroom helped students better learn the course material. Another, who considered it to be a disadvantage, noted that it was unprofessional and could be seen as preferential treatment given to some

students. This variation in ITAs' attitude toward the use of native language in classrooms exemplifies the already existing tension in the literature on the use of native language in classrooms. On one hand, the use of native language during instruction helps students better understand the course material (Garcines & Alvarez, 2017; Gotti, 2015), but on the other, it prevents them from improving their English competency (Garcines & Alvarez, 2017) that is required in a professional setting, especially in an increasingly global workplace.

While participants noted diversity in terms of the presence of international students, their experiences of classroom diversity were shaped by their own position as international GTAs. Although they noted national diversity among students, none of them noted classroom diversity in terms of other social factors such as race, gender, sexuality, religion, and age. This finding supports Zhou's (2009) argument that ITAs may not be aware of different facets of diversity present in the US classrooms as many of them come from relatively homogeneous cultures and might not have been exposed to different aspects of classroom diversity as reflected in US classrooms.

5.2.2 Intersection of ITAs' experiences with their GTA identity

Similar to participants' international identity, several aspects of participants' experiences made their GTA identity the most salient, even as these experiences interacted with participants' international and other identities. Participants described four aspects of their teaching experiences in which the intersections with their GTA identity were quite prominent. These included: 1) perceived knowledge of the course, 2) relatedness to students, 3) responsibility for the course and student learning, and 4) management of both teacher and student roles. The intersection of these experiences with participants' GTA identity again point to multiple complexities, issues of power, privileges that participants enjoyed, and disadvantages that they faced, as well as additional points where participants' GTA identity intersected with other identities. The following sections discuss these nuances in detail. It should be noted that as these experiences were linked to participants' GTA identity, these experiences may apply to domestic GTAs as well.

5.2.2.1 Perceived knowledge of the course

As might be expected, the GTA status is linked to a decreased power within the classrooms as students often see TAs as less knowledgeable. At the same time, though, they may have more knowledge because of more current content knowledge, creating self-perceived privilege. Participants' perception of their course knowledge illuminates this complexity in that they perceived their knowledge of the course content to be lacking and advantageous at the same time. On one hand, they believed that they had a lower understanding of the course material as compared to the course instructor because the instructor had been conducting research in the same area and teaching the same content for some time. However, at the same time, participants believed that they had a closer understanding of lab procedures or course topics because they had recently reviewed them. These findings are consistent with Muzaka's (2009) work who found that GTAs perceived their knowledge of the course content to be lacking. At the same time, students and faculty participants in the same study noted the benefits of GTAs in the course in that they are familiar with the latest material and can bring the most recent perspectives on the course topics.

5.2.2.2 Relatedness to students

In addition to the knowledge of the most recent course material, participants also noted their privilege in terms of their relatedness to students. The ability of ITAs to easily relate to students points to the intersection of their student identity with their teacher identity and the resulting advantage they have over instructors. ITAs' student identity reduces the power distance between them and students, leading to a more conducive learning environment where undergraduate students feel more comfortable asking questions of GTAs or making mistakes in front of them. As Kendall and Schussler (2012) suggest, professors may seem more distant and formal to students as compared to GTAs who are seen as approachable and engaging. This difference in perception may be due to the relatively age gap and shared student experiences. Hence they can better relate to a GTA and feel comfortable in asking questions (Muzaka, 2009).

5.2.2.3 Responsibility for the course and student learning

Similar to lower level of power difference that participants experienced with their students due to their GTA identity, they also had a lower level of power in relation to the course

instructors in making course decisions. ITAs in this study described having a relatively lower responsibility toward student learning and success and less discretion over course topics, teaching methods, and grading procedures due to their role as a GTA rather than a faculty member. However, this lower course responsibility was perceived as both advantageous and limiting by different GTAs, highlighting intersectionality's key principle that there is variation in the experiences of individuals within the same identity category (Collins & Bilge, 2016). While one of the ITAs in the study enjoyed the fact that they did not have to make "harsh decisions" for student because of lower course responsibility, another wished for more authority in making decisions about the course to better support student learning. Consistent with Park's and Ramos' (2002) finding that GTAs felt that their creativity was being suppressed due to a lack of authority in the course, this participant felt constrained by the fact that they even had to seek approval from the instructor before responding to students' queries. The experiences of this participant also suggest that the perception of power with respect to course responsibility is linked to the GTA's own interest in the teaching and the practices of the course instructor. This participant perceived a lower power in the course due to their high interest in teaching and low autonomy given by the course instructor. However, it should be noted that despite a perceived lower course responsibility and autonomy, participants possessed significant instructional power to make course decisions, and cared about helping students learn the course, as evidenced by the various navigational strategies they adopted.

5.2.2.4 Management of both teacher and student roles

Similar to participants' instructional experiences, participants' workload management experiences also highlight the intersectionality of roles that GTAs are required to fulfill and manage – teacher and student – and the power relations they are part of because of these roles. All GTAs, whether international or domestic, have to manage expectations from two supervisors. As teaching assistants, they are required to report to their course supervisors but as graduate students, they are answerable to their research advisors. This dual responsibility in turn influenced their workload management experiences related to balancing TA workload, research and coursework, and personal responsibilities. Several participants noted that their GTA work took a lot of time, which significantly reduced the amount of time they had to work on their research and make progress on their graduate degree. This tension between research and teaching

responsibilities experienced by GTAs has been highlighted by previous scholars (Muzaka, 2009; Park, 2002). Similar to GTAs in the study conducted by Muzaka (2009) who commented that “teaching took considerable time away from their research and could delay the timely conclusion of their PhD” (p. 6), participants in this study also expressed concern over the fact that their ability to meet their research expectations was suffering due to the time taken up by their GTA responsibilities. While faculty also need to manage the tension between research and teaching responsibilities, especially at a research-intensive institution where this study is situated, the limited power held by graduate students complicates this dynamic for GTAs.

As described by one ITA in this research, this tension between research and teaching responsibilities is further complicated for international GTAs who need to spend significant amounts of travel time to see their families. Also, although none of the participants noted it, ITAs experience a lack of power due to issues around visa requirements, and the related issues of funding and completion of degree within a limited timespan, adding to the pressure on ITAs to successfully meet their teaching and research responsibilities.

5.2.3 Intersection of the engineering context with ITAs’ experiences

While participants’ international and GTA identities emerged from the data as key categories of intersection of their experiences with their identities, the context of engineering in which the participants were situated also played a key role in shaping the issues of power and privilege they experienced. As discussed in Chapter 2, academic disciplines vary in the nature and structure of knowledge. These differences give rise to differences in teaching and learning practices, and ways to assess student learning (Braxton, 1995; Donald, 2002; Stark, 1998). Hence there may be differences in what students expect of their teachers and GTAs in engineering, giving rise to differences in experiences of and navigational strategies adopted by teaching assistants in engineering.

Although not a cross-disciplinary comparison, the results of this study highlight some of the nuances around power and privilege that may be specific to ITAs in engineering. First, despite highlighting differences in the educational cultures in terms of attention to theory and level of complexity of assignment problems, many participants noted the presence of a shared knowledge of the course content, which created privilege for them as they were already equipped with most of the content knowledge required to perform their GTA work. While the cultural

variations in teaching of engineering can be attributed to differing national histories and values (Downey et al., 2006; Downey & Lucena, 2004), a shared knowledge of the course content across national boundary points to a consensus across engineering educators across nations in terms of content to be taught in undergraduate programs. This consensus is typical of hard disciplines from which engineering derives its epistemic roots (Biglan, 1973; Stark, 1998).

Besides similarity in the course content, the larger pedagogical norms of engineering classes shaped the way participants experienced their work as ITAs, pointing to the intersection of participants' ITA identity with the engineering context. These intersections were evident in the course preparation methods, their interaction with students, and the ways they helped students learn the course. The methods of course preparation employed by ITAs point to nuances that are characteristic of engineering. Many ITAs noted solving homework problems or doing the lab experiments themselves as ways to prepare for teaching. This method of course preparation is typical of engineering which has a large number of laboratory courses and assignments that require numerical problem solving (Neumann, Parry, & Becher, 2002). Despite the slow emergence of pedagogical practices in STEM education to move toward open-ended coursework and ill-defined problem-solving (Kolmos & de Graaff, 2014; Lord & Chen, 2014), engineering is still dominated by course activities that stress fact-finding and reporting, and well-structured problem solving (Jonassen, 2014) as compared to soft disciplines that value face-to-face meetings involving discussions and debates on the course topics (Lindblom-Ylänne, Trigwell, Nevgi, & Ashwin, 2006). Hence, the course preparation methods adopted by ITAs focus on learning the 'correct' procedures for lab or solving the assignment problems beforehand to understand the 'right' way to solve them.

The presence of well-defined assignment problems also influenced the way students interacted with the participants. Participants noted that many students tried to get solutions to homework problems and rushed to office hours before tests and quizzes. This experience is characteristic of engineering disciplines that have a strong emphasis on problem solving with verifiably correct answers (Donald, 2002; Jonassen, 2014) and tests and exams are an important component of assessment as opposed to soft disciplines that mostly rely on essays, short answer papers, and project reports to assess student learning that have multiple 'correct' ways of solving them (Felder & Brent, 2005; Neumann et al., 2002). Similarly, the way ITAs helped students

asking for answers to assignment problems has engineering-specific nuances. ITAs noted helping such students by asking leading questions that would lead them to the correct solution. Given the presence of a right answer in engineering coursework and assignments, ITAs' approach of asking leading questions helped students to arrive at the correct answer or approach to solve the given problem.

Disciplinary nuances were evident not only in how ITAs helped students with assignments but also in how they explained course topics to students in general. Many participants emphasized the use of real-world examples to help students learn concepts, which participants were able to provide based on their own past experiences as students. Given the presence of a high level of technical and mathematical content present in engineering curricula (Cunningham & Kelly, 2017), it is important to use real-world implications of concepts to help students learn those better. Also, given the applied nature of engineering (Biglan, 1973), it is necessary to connect the course knowledge to real world applications so that students can learn how the course knowledge can be applied to solve real-world engineering problems. The ability of participants to use their past student experiences to provide relevant real-world examples to students also highlights the intersection of their student identity with their ITA experiences.

While the above intersections of ITAs' experiences with the context of engineering relate to the course content, the data also suggest a direct intersection of participants' engineering identity with their experiences. This intersection is present in ITAs' use of tools and techniques to manage their workload. Several ITAs noted using computer programs to grade student work, especially coding assignments. Given their own training as engineers, ITAs could apply their knowledge of programming learned during their engineering degree to write computer programs that could auto-grade student work without much manual effort on part of ITAs.

In addition to experiences related to ITAs as engineers, some participants also noted an experience that is specific to international GTAs in engineering, pointing to a complex intersection of participants' international and GTA identities with the context of engineering. This experience relates to the use of native language in a classroom setting with students from the same country. R1 universities such as Virginia Tech enroll about half of international students at US universities out of which about a quarter pursue STEM majors (Institute of International Education, 2016). Given a large number of international students in engineering, it

is likely that ITAs will encounter students from their own countries who speak the same native language. This may lead to a dilemma for the ITA whether they should communicate with those students in their native language if it leads to an ease in communication. In this study, one of the participants saw the ability to converse with home country students in their native language as an advantage while the other perceived it to be unprofessional.

5.2.4 Other significant navigational strategies adopted by ITAs

While ITAs' experiences and navigational strategies highlight an explicit intersection of their identities and the engineering context, there were some navigational strategies adopted by ITAs that do not point to such an explicit intersection. However, it is still important to critically examine these strategies as they help us better understand the role played by ITAs in undergraduate teaching. These strategies include: 1) content and delivery strategies, and 2) credibility-building strategies. From an intersectional lens, these strategies highlight the power that ITAs have to shape teaching. At the same time, these strategies illuminate the pedagogical and sociocultural strength ITAs bring to the US classrooms, thereby subverting the dominant deficit model of ITAs that views them as lacking in pedagogical and sociocultural skills.

5.2.4.1 Content and delivery strategies

As discussed in Section 4.2.1, ITAs employed a variety of content and delivery strategies that helped them support student learning and manage negative student behavior. International instructors (Hsu, 2014; Lepadatu et al., 2011) have previously noted the importance of working on pedagogical skills, which includes modifying content and delivery strategies, as a major strategy to navigate their teaching experiences. While pointing to ITAs' power as teaching assistants, these strategies, as adopted by ITAs in this study, also highlight ITAs' knowledge of contemporary teaching methods that support student learning.

To support student learning, ITAs noted using multiple examples and connecting the course topics to their real-world implications and other areas of knowledge in the course. Research on effective teaching has highlighted the importance of both these strategies. Talking about the importance of using multiple examples to explain course topics, Ambrose, Bridges, DiPietro, Lovett and Norman (2010) note that “[m]ultiple examples are important if students are to understand that theories and concepts can operate in a variety of contexts and conditions, and

they also increase the likelihood of students relating to at least some of them” (p. 183). Similarly, connecting the content to the real-world implications and other areas of academics helps students see the value of the content and the tasks that they are engaged in, thereby increasing their motivation to learn and improving their retention of the course knowledge (Ambrose et al., 2010; Bransford, Brown, Cocking, Donovan, & Pellegrino, 2000). Connecting concepts to their real-world implications is especially important in engineering courses that have a lot of abstract mathematical content (Cunningham & Kelly, 2017).

Some participants also suggested using student-centric active learning strategies for future semesters. For example, one ITA recommended using a project-based approach to teach programming to students with the view that the project-based approach will not only help students gain a better insight of the course content but also teach them other skills required of engineering such as teamwork and self-directed learning. Another ITA noted keeping the lectures short and using discussion-based collaborative teaching to keep student attention and help them learn from one-another. ITAs’ adoption of these approaches is in line with the recent movement in engineering education toward student-centric inductive learning approaches (Kolmos & de Graaff, 2014; Lord & Chen, 2014) that increase the likelihood of deeper understanding of concepts and transferability of learning to work settings (Prince & Felder, 2006).

5.2.4.2 Credibility-building strategies

As discussed earlier, ITAs’ GTA and international identities also helped build rapport with students. As GTAs, they found themselves to be closer to students in general due to their shared student identity (See Section 5.1.2.2). And as international GTAs, they found themselves to be closer to international students due to their shared international identity (See Section 5.1.12).

In addition to the rapport that participants built with students due to their GTA and international identities, ITAs also used their power as teaching assistants to employ research-based strategies to build credibility with students that created a conducive and supportive learning environment. The findings of my research suggest that ITAs built credibility with students by being approachable to students, showing patience while working with them, ensuring preparedness to help students, and being honest about their strengths and limitations. Some

participants also sought and used feedback from students while maintaining a learning environment in which students felt comfortable giving their critiques of ITAs' teaching. These strategies to build rapport with students are congruent with faculty who have highlighted some of the ways to build rapport with students such as showing willingness to solve students' problems, maintaining a classroom environment in which students feel comfortable to engage with the professor and the TAs on challenging topics (Chen, 2014; Lutz, Hixson, Paretti, Epstein, & Lesko, 2015; Pembridge, 2011), ensuring preparedness for their teaching responsibility (Hebbani & Hendrix, 2014), and being open to students' ideas and critiques (Hsu, 2014). Scholars have previously suggested that building rapport with students helps create a learning environment in which students feel supported and are willing to learn from instructors (Lutz et al., 2015; Pembridge, 2011). Like the content and delivery strategies, these credibility-building strategies also highlight ITAs' knowledge of effective pedagogical techniques.

5.2.5 Summary of ITAs' teaching experiences through the lens of intersectionality

As discussed above, this study uses intersectionality as the primary theoretical framework. The intersectional lens helps illuminate the complex intersections of power and privilege in ITAs' experiences, thereby helping us move beyond the deficit model apparent in prior work.

The experiences of ITAs as described in Chapter 4 and discussed in the previous sections illuminate the complexity in ITAs' experiences because of the intersection of their multiple identities. It is difficult to point to a single identity of the ITA that influenced a particular experience. For example, participants noted facing challenges in communicating with students. However, it was not always clear if those challenges were due to teaching in a non-native language or because of them being novice teachers, the latter of which also influences domestic TAs' communication proficiency (Park, 2004). This is why, in the above sections, while describing the intersection of ITAs' salient identities – international and GTA identities - with their teaching experiences, a discussion of their other complicating identities is presented.

This complexity in ITAs' experiences further manifested in terms of the variations observed in their experiences. For example, while none of the participants spoke English as their first language, not all of them found teaching in English particularly challenging. In fact, some

participants expressed confidence about their ability to communicate and explain the course material to students. Similarly, there were variations in terms of participants' beliefs about the use of native language during instruction and their responses to the limited course responsibility they had.

At the same time, the complexity in ITAs' experiences is also evidenced in their simultaneous experiences of power and privilege. While the presence of privilege was experienced as an advantage, a lack of power manifested as a challenge or disadvantage for the ITAs. Participants described simultaneously experiencing advantages and disadvantages due to their multiple intersecting identities. Some of the significant advantages included an increased ability to build rapport with students leading to a more comfortable learning environment for those students, the use pedagogical practices from their home countries, and an increased ability to help students due to a more recent understanding of the course content. The significant disadvantages included communicative challenges due to their status as non-native English speakers, a lower perception of their expertise in the course content as compared to the instructor, limited access to resources required to teach effectively, and the requirement of meeting expectations from two different supervisors- research advisor and course instructor.

This complex understanding of ITAs' experiences help us move beyond the deficit model of ITAs in prior work by pointing to the linguistic, pedagogical, and sociocultural strengths that ITAs bring to US classrooms. Countering the idea that ITAs lack the required communicative strength to teach undergraduate students (Fitch & Morgan, 2003; Gravois, 2005), some ITAs in this study used their communicative competency to better support student learning. Similarly, in addition to using the wealth of pedagogical strategies from their home countries, ITAs in this study used research-based pedagogical strategies such as using real-world examples to teach concepts, connecting the concepts with students' prior knowledge, and building rapport with students to help students learn the course. The use of these pedagogical techniques not only counters the notion that ITAs lack pedagogical skills (Jenkins, 2000) but also highlights the fact that ITAs have some skills, e.g., the knowledge of a different set of pedagogical techniques from home countries, that domestic GTAs generally lack. Finally, ITAs in this study utilized their sociocultural skills to connect with their students – both domestic and international, leading to a

supportive learning environment, thereby negating the view that ITAs do not have the sufficient cultural knowledge to teach classes at US universities (Plakans, 1997).

5.3 Implications for practice

While this research adds to the current understanding of the complexities of ITAs' experiences from a critical perspective, it also points to various implications for practice for engineering departments and universities, faculty (course instructors and research supervisors), and ITAs. These implications address the power differential experienced by ITAs in the US academy and help them use their pedagogical and cultural privileges, thereby helping us move toward an educational paradigm that treats ITAs as valuable stakeholders of the undergraduate education in US universities. The following sections discuss these implications in detail.

5.3.1 Implications for engineering departments and universities

The purpose of this study is to help engineering departments and universities to better engage ITAs in the process of undergraduate engineering education. To this end, the findings of this study highlight certain implications for engineering departments and universities that address the issues of power experienced by ITAs, and empower them to become better teachers. First, efforts can be made by engineering departments and universities to help ITAs learn communication and workload management skills. Multiple participants in this study noted a lack of power due to the communication challenges they faced in communicating the course content to the students. Similarly, they noted a lower level of privilege due to managing two different sets of workload – teaching and research - and meeting expectations from two supervisors. Training sessions can be organized at departmental and university levels to help ITAs improve their communication and workload management skills. However, moving beyond the deficit model, it is important that these training programs take input from ITAs about their diverse needs, and acknowledge their existing communicative and managerial competence (Zhou, 2009).

Second, besides organizing training sessions to address communication and workload management issues, universities can help ITAs gain power by creating a university environment that views ITAs as a valuable resource. Several ITAs in this study saw their usage of different English dialects and accents as a disadvantage. However, ITAs increase cultural and linguistic diversity on college campuses through their knowledge of different English dialects and diverse

ways of communication. Additionally, they possess invaluable skills including the knowledge of different ways of teaching and practicing engineering. Engineering departments and universities can leverage these skills brought by ITAs by changing the paradigm at the university level that views different ways of teaching, learning, communicating, and practicing engineering as advantages. One way this kind of university environment can be cultivated is by encouraging undergraduate students interact with ITAs through co-mentoring programs to learn about cultural differences in engineering practice and the usage of English. Such programs will not only help undergraduate students learn about different cultures but also help ITAs gain an understanding of the US culture (Zhou, 2009). Gaining intercultural competence is a necessity for undergraduate students in an increasing global engineering workplace (Johri & Jesiek, 2014).

Third, in addition to leveraging ITAs' linguistic abilities, universities can make efforts to make ITAs aware of the diverse groups of students and the value of diversity present in the classrooms. As ITAs come from different countries, they may be unaware of the diversity in terms of race, gender, class, religion, age, and sexuality that US classrooms have and what approaches need to be taken to support students with various backgrounds (Zhou, 2009). For example, one of the ITAs in this study noted that they were unaware of the fact that transfer students have not always completed prior courses with the exact course content as regular students at the university and hence may struggle with some of the concepts that most of the class is comfortable with. This lack of awareness initially posed difficulty for them to provide adequate support to transfer students. Similarly, none of the participants noted experiencing classroom diversity in terms of social factors such as race, gender, class, religion, age, and sexuality, as present in US classrooms. Engaging ITAs in discussions on the various forms of diversity present in US classrooms and ways to support a diverse groups of students will empower ITAs become more inclusive teachers.

5.3.2 Implications for faculty (course instructors/research supervisors)

In addition to implications for engineering departments and universities, the research results also point to implications for faculty – both the course coordinators for the classes taught by the GTAs and their research supervisors – that help ITAs better manage their teaching and develop their teaching skills. First, to help ITAs manage TA work with professional and personal responsibilities, both course instructors and research advisors should build flexibility into ITAs'

schedules so that they can pay adequate attention to both their teaching and research work and personal aspects of their lives (Park, 2004). One of the participants in this study noted how they could reschedule their office hours when they were traveling for research work. The same ITA noted how their research advisor allowed them more time to finish a conference presentation to help them finish their grading work. Similarly, another participant noted the support they got from their course instructor in terms of being able to complete some of the TA work overseas when they had to travel to their home country to attend a family event. Such flexibility in ITAs' schedules will better empower them to effectively manage the demands of both research and teaching without feeling a complete lack of power in managing two sets of responsibilities.

Second, course instructors can also empower ITAs by building a cooperative and supportive teaching team that helps both ITAs and course instructors in managing several aspects of teaching such as course preparation, management of negative student behavior, and simultaneous management of teaching and research responsibilities. In this study, a higher level of engagement with the teaching team generally helped ITAs effectively navigate their teaching experiences while a lower engagement hindered ITAs in effectively fulfilling their TA responsibilities. However, adequate care should be taken that these teaching teams do not Americanize the ITAs by helping them “fit” into the contemporary US classrooms (Zhou, 2009). Rather, these teams should see ITAs as budding colleagues who possess valuable pedagogical and cultural strengths that can be used by fellow instructors and GTAs to create a better learning experience for undergraduate students. As an example of this practice, one ITA in this study noted a more equitable power distribution within the teaching team in that the ITA frequently gave feedback to the course instructors and fellow GTAs about the course content and assignments, which were implemented to modify the course content and assignments.

Third, and importantly, to help ITAs grow as future teachers, course instructors should gradually give more power to GTAs by increasing their GTAs' teaching responsibilities if they have gained considerable experience teaching a course. Some of the participants in the study expressed dissatisfaction over the limited discretion they could exercise as a GTA. In addition to getting help in undergraduate teaching, the purpose of hiring GTAs is to develop future faculty (Park, 2004). So it is important that GTAs are slowly given more teaching responsibility so that they could learn about the various aspects of being an instructor. At the same time, an increased

instructional power will help ITAs see themselves as valuable contributors to undergraduate education, thereby motivating them to better engage with their GTA responsibility (Park & Ramos, 2002).

5.3.3 Implications for ITAs

As this study focuses on understanding the experiences of ITAs, the findings highlight some implications for ITAs that relate to how they value themselves in the US academy. ITAs should use their privileges and skills – linguistic, pedagogical, and cultural - to better support student learning instead of being swayed by the deficit model of ITAs at US universities and tempted to blindly assimilate into the US educational culture. As discussed earlier, several participants brought multiple advantages to the US classrooms such as different English dialects, pedagogical practices from home countries, and ability to better connect with undergraduate students. However, despite increasing emphasis on globalization, none of the participants noted their presence as a potential benefit for students. Moreover, echoing prior research (Muzaka, 2009; Wang, 2016), some ITAs in this study also saw themselves as lacking in linguistic and pedagogical skills. One participant even described assimilating into the US norms by learning both the pedagogical practices and English accents used in the US. While participants may have expressed these views due to the influence of the deficit model of ITAs on the self-perception of their skills, these views further support and perpetuate their negative portrayal in the US academy. Such views also devoid undergraduate students of the valuable cross-cultural learning experiences with ITAs. Hence, ITAs should consider themselves as valuable resources for US universities and use their privileges to better support student learning and development of intercultural competence among undergraduate students.

5.3.4 Implications for undergraduate students

Like ITAs, undergraduate students are directly influenced by the presence of ITAs in their classes. Undergraduate students should utilize the pedagogical, linguistic, and cultural privileges that ITAs bring to develop their own engineering and intercultural skills. Given the increasing importance of acquiring global competence in engineering work, the presence of ITAs in classrooms provides a substantial opportunity for students to learn about different ways of practicing engineering and different ways of communication. As the findings of this study

suggest, ITAs not only have the required knowledge of the course content but also possess the knowledge of different ways of teaching, and different English dialects. Thus, instead of treating ITAs' presence in classrooms as a disadvantage, as documented by prior research (e.g., Fitch & Morgan, 2003; Plakans, 1997), undergraduate students taught by ITAs should engage with ITAs to improve their knowledge of the engineering course content and develop intercultural competence, and universities should help undergraduates learn how to leverage such engagement.

5.4 Limitations and future work

5.4.1. Limitations in the research design

This research adds to our understanding of ITAs' experiences and analyzes their experiences through critical lens highlighting issues of power and privilege they face in the US academy, and points to several implications for practice for the universities and engineering departments, faculty, and ITAs to help them better engage in the process of undergraduate engineering education. However, there are limitations in this research design in terms of site and participant selection and data collection methods.

The biggest limitation of the study is that it is a single-institution study. As discussed earlier, participants were recruited from Virginia Tech for the study. Virginia Tech provides a specific context for shaping the experiences of participants in that it is a research-focused institution that attracts engineering graduate students from all over the world. More than half of engineering graduate students at the university are international students. Also, it is a public, land-grant university (Virginia Tech, 2017). As one of the basic principles of intersectionality suggests, individuals' experiences do not transfer across contexts (Smooth, 2010). Hence, it is possible that ITAs in a private university that is focused on teaching and has fewer international graduate students have different experiences of teaching as compared to those at Virginia Tech.

In addition to site-selection, a limitation of the study stems from the self-selection of participants for the study. As the study required participants to participate in the process of data collection for a semester, only those ITAs who were motivated to engage in the study for that long participated in and completed the study. To reduce this bias, I compensated the participants each time they engaged in the process of data collection. I offered them a gift card worth \$20

after completion of each interview and they were eligible to enter a raffle (for a \$25 gift card) each time they completed the weekly reflection within a week of sending out the prompts. Getting compensated for their time and involvement may have motivated more participants to engage in the semester-long study. It is also possible that participants who perceived themselves to be non-proficient in English were reluctant to volunteer to participate in the study because of the weekly writing involved in the study. In order to recruit such participants, I used snowball sampling in that I asked my acquaintances and study participants to advertise the study to potential participants (Patton, 2001). Seeing other non-native English speakers participating in the study could have mitigated some of the fear of participation in the participants and encouraged them to participate in the study. However, despite my efforts to motivate potential participants, it is possible that ITAs who were either very busy with research or teaching or other commitments during the semester, or felt uncomfortable with their English competency might not be represented in the participant pool.

Besides recruitment of participants from a single institution and self-selection of participants, there were some limitations inherent in the methods of data collection. The study used interviews and weekly reflections to collect data. Interviews rely on human memory and human memory is not always reliable (Leedy & Ormrod, 2005). Moreover, not everyone is as articulate as is required to present the information in an appropriate manner during the interview. This is especially true for interviews conducted in a second language. None of my participants were native English speakers and this may have hindered their abilities to accurately describe their experiences during interviews or in weekly reflections in English. There were many instances during the interviews when participants expressed difficulty in discussing their experiences due to their English proficiency. This difficulty in English communication may have prevented some participants from fully expressing their thoughts and experiences.

While the data collected from interviews were supplemented by weekly reflections, it is possible that asking participants to reflect on their experiences may have changed the natural course of classroom activities and their experiences (Creswell, 2009; Leedy & Ormrod, 2005). In fact, one of the study participants noted that completing the weekly reflections gave them new insights about their teaching and the modifications they could make to their teaching.

5.4.2 Future work

The limitations in the research design of this study along with the findings of this research, as discussed in the above sections, point to further directions for research to deepen our understanding of ITAs' experiences. The following paragraphs discuss the possible avenues for future work.

5.4.2.1 Future work addressing the limitations of the research design

As noted in the last section, there are limitations in the research design due to site selection and data collection methods in that the findings may be biased due to the study being a single institution study and collecting data in participants' non-native language. To mitigate the biases in the findings due to the study focusing on one R1 institution and address intersectionality's concerns over the transfer of findings from one context to another, future work can focus on ITAs from multiple institutions of various types in terms of their size (large vs. small), research activity (research focus vs. teaching focus), student demographics (low vs. high percentage of international students) and location (rural vs. urban). Including different type of institutions will give a more complete picture of engineering ITAs' experiences at US universities.

Similarly, to address the issue of participants' thought being lost due to their struggles with English communication, part or all of data can be collected in participants' native languages in future research. The weekly reflections can especially be collected in their native languages as unlike interviews, they do not require an immediate interpretation and understanding on part of the researcher. Data were collected in participants' native language in the study conducted by Wang (2016) to explore the professional identity development of ITAs at a US university.

5.4.2.2 Future work to deepen our understanding of ITAs' experiences

In addition to the future studies that can be done to mitigate the biases in site selection and data collection methods, further research can also be done to build on the findings of this study. While this study highlights the influence of ITAs' international and GTA identities on their teaching experiences, the influence of participants' other significant identities such as race and gender were missing from the collected data. Further work can closely look at the influence these identities on ITAs' experiences. Scholars (Chen, 2014; Mohanty, 2011; Mutua, 2014) have

previously pointed out that social factors such as race and gender significantly influence international TAs' or instructors' teaching experiences. Modifications can be made to the current data collection protocols to elicit the influence of these social identities on ITAs' experiences.

In addition to closely looking into the influence of ITAs' social identities on their teaching experiences, a longitudinal study can be done to understand how ITAs' experiences change with time. One of the principles of intersectionality suggests that individuals' experiences change over time (Smooth, 2010). In sync with this argument, Beijaard, Verloop and Vermunt (2000) note that as teachers gain more teaching experience, they develop rich and well-organized knowledge drawing on their past experiences. Also, their sense of self and how they see themselves in relationship with others shifts with experience. Consistent with this argument, participants in this study noted that they became more confident to work with students and manage their time as they gained more teaching experience. While this study explores ITAs' experiences over a semester of teaching, a multi-semester study exploring their experiences can give valuable insights into how their experiences shift over time.

Further research can also explore the experiences of ITAs who have different teaching responsibilities than the ones in this research. While the participant pool for this study included ITAs a range of teaching responsibilities, none of them was an "Instructor of Record" for their course. Rather all were assisting the course instructor(s) in managing various aspects of teaching. Future work can be done to understand the experiences of ITAs who serve as Instructors of Record. An Instructor of Record has the full responsibility of teaching a course including designing the course syllabus, assignments, tests and quizzes; grading tests and assignments; giving in-class instruction to students; conducting office hours; and assigning a final letter grade to students at the end of the semester (Plakans, 1997). Given their increased responsibility for the course and higher level of engagement with students, they may have different experiences as compared to TAs with limited responsibility. Hence, studies focusing on ITAs who serve as Instructors of Record can give additional insight into their experiences.

Additionally, building on the findings of this research, future work can explore and contrast the experiences of international and domestic TAs. This study focuses on exploring the experiences of international TAs and the results of this study point to various experiences that ITAs have in teaching engineering classes. A study comparing the experiences of international

teaching assistants with their domestic counterparts may help universities better recognize the various strengths that both international and domestic TAs have and the different challenges they face due to the intersection of their identities. This understanding will help universities better engage both international and domestic TAs in the process of engineering education.

Finally, subsequent work can be done to critically explore faculty and institutional perspectives on ITAs' teaching. This research explores ITAs' experiences from their own perspective using a critical stance. Incorporating faculty and institutional perspective will triangulate the findings from this study and give a complex picture of the power and privileges that ITAs have or lack in the US academy.

5.5 Conclusion

This research sheds light on the experiences of international teaching assistants in US engineering classes. Given ITAs constitute an important part of the undergraduate instructional process at US universities, particularly in engineering, it is important to understand their experiences so that adequate efforts can be made to effectively engage with, support, and leverage their skills. To this end, this study utilizes a multiple-case study approach using intersectionality as the guiding framework to understand seven ITAs' experiences, navigational strategies, and influence of their social identities on their experiences. Data were collected at a large public research university with a high percentage of international graduate and undergraduate students. Data collection methods involved three in-person interviews with participants at the beginning, middle, and end of the semester, and weekly reflections completed by the participants during the semester. Data were analyzed using a priori codes and categories drawn from the existing literature, which were then modified based on the emergent findings.

The findings from this study suggest that ITAs' teaching experiences can be categorized into five broader areas: English competency, sociocultural, course preparation, instructional, and workload management. Also, ITAs use a variety of strategies to navigate these experiences including those related to content and delivery, building credibility, managing their time and workload, and using support. In terms of the influence of their social identities on ITAs' teaching experiences, participants identified two aspects of their identity significantly influencing their

experiences: international identity and GTA identity. Additionally, participants' experiences were significantly shaped by the engineering context.

This study makes significant contribution to the literature on ITAs' experiences. It builds on the existing research to expand our understanding of ITAs' teaching experiences and navigational strategies. At the same time, the study takes a critical stance on ITAs' experiences in that it highlights the complex intersections of power and privilege with ITAs' social identities and the engineering context, thereby helping us move beyond the deficit model of prior work.

While making contributions to the existing body of knowledge, the findings from this research also point to implications for various stakeholders including engineering departments and universities, faculty, and ITAs themselves to better involve ITAs in the process of undergraduate engineering education by using ITAs' existing linguistic, pedagogical, and cultural skills. It is my sincere hope and belief that this research will help engineering educators take a step forward in effectively engaging with ITAs, leading to a more fruitful GTA experience for them and a better learning experience for the students taught by them.

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Appendix A

Table A-1: A priori categories for capturing ITAs' experiences adapted from Kuo

Category of Experience	Codes	Code Definition
Linguistic Experiences	Expressing concerns about language usage	ITA describes potential problems they may face due to their linguistic abilities and difference in ways of speaking English.
	Confidence about linguistic ability	ITA expresses confidence about their linguistic ability
	Problems due to lack of linguistic proficiency	ITA describes problems they face or faced in the past due to their linguistic abilities.
	Problems due to different way of using English	ITA describes problems they face or faced in the past due to difference in ways of speaking English.
	Using different way of using English as a benefit	ITA describes using their different way of speaking English as pedagogical tool.
Cultural Experiences	Appropriate behavior for themselves	ITA describes an experience concerning appropriate classroom behavior for themselves.
	Appropriate student behavior	ITA describes an experience concerning appropriate student behavior.
	Appropriate instructional style	ITA describes an experience depicting their lack of knowledge about appropriate instructional style or implementing appropriate instructional style in their class.
	Academic level of students	ITA describes their knowledge of the academic level of students or lack thereof, and related positive or negative teaching experiences.
	Diversity present in a US engineering classroom	ITA describes an experience concerning their knowledge about diversity present in their classroom or lack thereof, and the associated positive and negative teaching experiences.
	Academic integrity	ITA describes an experience concerning academic integrity.
Instructional Experiences	Instructional responsibilities	ITA describes an experience about fulfilling their teaching responsibility or the challenges they face in doing so.
	Testing and grading systems	ITA describes an experience depicting their lack of knowledge about the testing and grading system or successfully implementing the required testing and grading schemes.
Classroom Management Experiences	Negative student behavior	ITA complains about student behavior they do not like or find inappropriate.
	Positive student behavior	ITA describes student behavior that made them feel respected and welcomed.

Table A-2: *A priori* categories for capturing ITAs' navigation of experiences

Categories for Navigation of Experience	Codes	Code Definition
Working on Pedagogical Skills (Hebbani & Hendrix, 2014; Hsu, 2014; Lepadatu et al., 2011)	Adapting teaching style	ITA describes adapting their teaching style to better meet the needs of students.
	Modifying course content	ITA describes modifying the course content to better meet the needs of students.
	Asking for feedback	ITA describes asking students taught by them, fellow graduate students, or faculty to give them feedback on their teaching.
	Ensuring preparedness for class	ITA notes that they make sure they are prepared for the class.
Seeking Help (Bresnahan & Cai, 2000)	Seeking help from faculty	ITA describes seeking help from faculty members to navigate teaching issues.
	Seeking help from university support system	ITA describes seeking help from the university resources such as GTA Academy or CIDER.
	Seeking help from students	ITA describes seeking help from fellow graduate students.
Engaging with Students (Chen, 2014; Hebbani & Hendrix, 2014; Hsu, 2014; Zhang, 2014)	Making roles and expectations explicit	ITA describes making roles and expectations clear with students to mitigate future conflicts.
	Establishing rapport with students	ITA describes adopting strategies that help them establish rapport with students.
Working on Linguistic Skills (Hebbani & Hendrix, 2014; Hsu, 2014; Mutua, 2014)	Taking English classes	ITA describes taking English classes to improve linguistic skills.
	Working on accent	ITA describes modifying or working on their accent.
	Discussing linguistic issues with students	ITA notes discussing linguistic issues with their students.
Change in Identity (Chen, 2014)	Negotiation of identity	ITA describes negotiating their social identities as a part of navigating teaching experiences.