Abstract

Undergraduate Learning Assistants (LAs) are being utilized more and more to support small-group collaborative learning, especially in large STEM classes. In this thesis, I use thematic analysis of 88 written reflections to interrogate how LAs engage in a dialectical negotiation of their instructional practice. Applying Gee’s (2012) framework, I pose the constructs of “student discourses” and “teacher discourses” for insight into the ways LAs navigate the classroom space. Being members of both student and teacher communities, LAs negotiate between their values as expert students and novice teachers. LAs express leveraging aspects of their positionality as an intermediary between the students and the professor and the graduate teaching assistants.

Analysis of the LAs’ reflections revealed two distinct orientations: (1) transactional, oriented towards the products of learning, and (2) constructive, oriented towards the process of learning. Implications for LA programs and STEM instruction, more generally, are presented.
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I would also like to thank my family and friends for their support and for being my biggest cheerleaders as I’ve gone through my master’s degree.
Land Acknowledgement

As a gateway to embracing and acknowledging Indigenous ways of life, I would like to begin with a land acknowledgment.

“Tufts University’s Medford/Somerville campus sits on the colonized homelands of the Massachusetts tribal people, who took their name from the Algonquian term describing the area visible from the Great Hill, now referred to as the Blue Hills that lie south of present-day Boston. The Massachusetts came into contact with the Nipmuc to the west, the Pawtucket to the north, and Wampanoag to the south, related peoples who shared mutually intelligible languages. As an institution that benefits from the ownership of land once inhabited and cared for by Indigenous communities, Tufts has a responsibility to recognize this history and engage with the descendants and nations who represent the original peoples of what is now eastern Massachusetts.” (Tufts, 2022).
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Chapter 1. Introduction

Learning Assistants (LAs) are undergraduate students who assist with instruction in studios, lectures, labs, and discussion sessions (Otero et al., 2006; Otero, Pollock, & Finkelstein, 2010). They have been utilized across the United States in chemistry, biology, physics, and engineering courses (Cao et al., 2018; Otero et al., 2006; Otero et al., 2010). Their main role includes supporting active learning by facilitating small group interactions and assisting with challenging concept-based learning during class. LAs also participate in a pedagogy seminar where they learn about responsive and inclusive teaching practices. The pedagogy seminar instructor, content area instructor, as well as other LAs, formulate a strong network of support as an LA takes on the role of instructor, often for the first time. In this context, LAs navigate between being novice teachers and expert students. Their student orientation has been fostered by years of performing as a student. However, most LAs have limited teaching experience and they take the role of a novice teacher once they become LAs.

Primary research reports on LAs focus on their role in improving undergraduate courses and supporting curriculum transformation, teacher recruitment and preparation, discipline-based education research, and departmental & institutional change (Barrasso & Spilios, 2021). LAs have been shown to positively influence student outcomes such as satisfaction, performance (Sellami et al., 2017), engagement, conceptual understanding (Caravez et al., 2017; Herrera et al., 2018; Thompson & Garik, 2015), retention (Alzen, Langdon, & Otero, 2017; Alzen, Langdon, & Otero, 2018), and reduction of performance gaps (Van Dusen et al., 2016; Van Dusen, White, & Roualdes, 2020). Furthermore, LA-instructor relationships have been characterized in the literature (Campbell et al. 2019). LA participation, discussed through a community of practice lens, has been shown to have an impact on identity, influencing how these
undergraduate students see their “physics selves” (Close et al. 2013, 2016; Conn et al., 2014). These empirical studies have shown the impacts that LAs have on their peers as well as instructors, but few have addressed LAs sensemaking and navigation across the complex social landscapes while being expert students and novice teachers.

Their new role as emergent teachers requires LAs to acquire a set of social practices, rules, and skills with which they may be unfamiliar. The development of social practices, rules, and skills are supported by the LA pedagogy seminar taught by STEM educators who are often involved in using the LA program to create systemic change among STEM faculty. Largely, the seminar centers reform pedagogies like responsive teaching through academically productive talk (Michaels and O’Connor, 2012), using failure as a productive learning tool (Kapur, 2014), and viewing what are called misconceptions as useful tools to make sense of the world (Campbell, Schwarz, and Windschitl, 2016; Cao and Koretsky, 2018). It has been suggested that LA professional development through the pedagogy course is a key reason for the success of the LA program (Quan et al., 2017). Thus, exploring the complex ways that LAs negotiate between their student and teacher roles allows us to find ways to improve the pedagogy course and better understand the challenges of reforming STEM instruction at the university.

To conceptualize the LAs negotiation between roles, I use Gee’s (2012) framework of discourses as a “socially accepted association among ways of using language and other symbolic expressions of thinking, feeling, believing, valuing, and acting, as well as using various tools, and technologies, among ways of using language and other symbols that we are born into and are taught” (p.152). The framework of discourse enables both the investigation of various LA identities and also how those identities are negotiated in given contexts (Beauchamp & Thomas, 2009; Beynon, 1997). The LAs’ student discourses and the orientations that make up these
discourses have been fostered by years of performing well as a student. However, most LAs have limited teaching experience and they take the role of a novice teacher. This new role requires them to acquire a secondary discourse with which they are likely less familiar. Reconciling these roles prompts LAs to negotiate between their beliefs as expert students and novice teachers. The idea of negotiation forms the premise for this analysis because an LA’s practices and values are in constant conversation within the classroom context and must be negotiated to make instructional moves. I seek to characterize their borderline discourses as both students and teachers. More generally, unpacking the LAs’ student and teacher discourses allow us to probe the contradictions, in a dialogic sense, between student and instructor objectives in reform pedagogies like responsive teaching.

In this thesis, I focus on how learning assistants navigate being novice teachers and expert students. I stress that I am not making claims about specific language use, but that I am making claims about the implicit values LAs bring to their student-teacher identities - the values they bring to practice. LAs, being members of both student and teacher communities, negotiate between their beliefs as expert students and novice teachers.

I propose the following research questions:

1. **Positionality:** How do LAs view their role in the class that they are supporting in relation to the enrolled students and to the instructor?
2. **Negotiation:** In what ways do LAs draw on their experiences as expert students (student discourses) and experiences as emerging teachers (teacher discourses) in making sense of their work as LAs?
Chapter 2. Literature Review

Near-peer curricular models are a form of collaborative learning which utilize more experienced peers to mentor, motivate, and teach less experienced peers (Bulte et al., 2007; Burch et al., 2010). Near-peer curricular models first gained traction in medicine, in part, to address the concern that physicians need to be effective teachers yet receive little to no formal training (Bulte et al., 2007). Additional benefits of near-peer curricular models cataloged in the medical literature include: assisting with staffing shortages, ameliorating financial pressures and increased student numbers, and creating environments with learning diversity (Burch et al., 2010). Outcomes reported are increased student confidence (Burch et al., 2010; de Menezes & Premnath, 2016) and generating a culture of teaching in medical settings (Burch et al., 2010; Lockspeiser et al., 2008; de Menezes & Premnath, 2016). These near-peer curricular models often do not have a pedagogy seminar associated with them.

Near-peer curricular models have migrated to other STEM fields like chemistry with positive effects as well. Danowitz (2021) used near-peers for a “Teach What You Know Day” in an advanced organic chemistry course, having students teach one another about an organic chemistry topic with which they were familiar. This approach was generally positively received by students as they had opportunities to improve their scientific communication skills, insight into instructional design, as well as the ability to recall and solidify knowledge from previous chemistry classes. Tischhauser (2018) describes how near-peer learning increased feelings of comfort in the lab as well as increased student-teacher instructional times for both graduate student instructors (GSI) and undergraduate near-peer instructors (UGTS). Bourne et al. (2021) discuss the difference between the perceived roles held by GSI and UGTS. GSI were asked more about conceptual knowledge, course policies, and grading while UGTS were asked more about
equipment and troubleshooting in the lab. However, students did not have any significant
difference in their perceptions of GSI and UGTS other than the fact that UGTS often could relate
to the experiences of the students in the class.

In the Learning Assistant (LA) model, the LA is required to take a pedagogy seminar,
differentiating it from many near-peer programs often described (Gray et al., 2010). The LA
model was conceived at the University of Colorado and is currently supported by the Learning
Assistant Alliance that includes 119 LA programs (Learning Assistant Alliance, 2022). The
stated goals are to improve undergraduate education, transform science departmental values by
engaging both education and STEM faculty in research-based educational transformation, and
increase the recruitment and retention of qualified secondary math and science teachers.
Interested STEM instructors opt into this program and submit proposals to request LAs for their
course which detail what kind of structural and organizational changes they plan on making
using LAs on their instructional teams. Undergraduate students apply to be LAs, are hired by the
department, and are typically awarded a stipend for their work in a class.

Figure 1 displays the three central elements of the LA model. The LA pedagogy seminar
focuses both on pedagogical theory and provides a forum for the LAs to discuss and reflect upon
their experiences with other student instructors. The course instructor engages in regular
meetings with LAs in their course about content-specific delivery. Finally, LAs practice by
facilitating small group collaborative learning in the classroom attending to group dynamics and
assisting with challenging concept-based learning. The model emphasizes the active participation
of LAs in both pedagogy and praxis, providing a strong network of support for LAs which
includes their pedagogy seminar instructor, content area instructor, and fellow LAs.
Research has shown that LAs can greatly impact student outcomes (Sellami et al., 2017) like engagement (Hernandez et al., 2021), conceptual understanding (Caravez et al., 2017; Herrera et al., 2018; Thompson & Garik, 2015; White, Van Dusen, & Roualdes, 2016), retention (Alzen et al., 2017; Alzen et al., 2018), and reduction of achievement gaps (Van Dusen et al., 2015; Van Dusen, White, & Roualdes, 2020). Studies focusing on the removal of achievement gaps have been conducted to understand an LA’s impact on equity in the classroom.

Achievement gaps are defined as persistent academic disparities between groups of students from different demographics. Van Dusen et al. (2016) used a LA Supported Student Outcomes (LASSO) online assessment tool to find broad trends in student outcomes comparing courses that have LAs to those that do not. Using multiple linear regression models, they concluded that instructional teams that include LAs are associated with the removal of achievement gaps. However, a follow-up study (Van Dusen et al., 2020) showed mixed results on how collaborative learning impacted equity, suggesting the need for a better understanding of how LAs impact student learning and group dynamics. Hernandez et. al (2021) discuss the nature of LAs as a
social support instrument that can be used to elicit increased engagement from students. They used social support theory to generate a model for how LAs engage in appraisal, emotional, and informational support leading to a survey instrument to help others gauge the way LAs provide social support. Their study not only reinforces how engagement is positively impacted by LAs as they help remove barriers to active learning, but their work also begins to help researchers to view this phenomenon mechanistically.

Research indicates that students who act as LAs shift their conceptions of schooling and instructional decision-making processes. Conn et al. (2014) observed that experienced LAs move away from “correct-answer-oriented” definitions of competence and move towards asset-based perspectives of learning that repurposes being wrong as a valuable part of the learning process. However, they notice that this shift of thought is not present within their Novice LAs. These conceptions of schooling aren’t exclusive to thinking about the role of correct answers. Thompson and Garik (2015) noticed that there is a large dichotomy between students and LAs in terms of student priorities in introductory courses. Students prioritize performance in the course, especially on exams, but LAs emphasize learning for understanding and collaborative learning. Despite these differences, those students reported that they were content with the support from the LAs. Their experiences in the LA program not only impact LAs short-term conceptions of schooling but also extend to practice for those who become K-12 teachers. Barr et al. (2012) observed that in-service science and math teachers who were formerly LAs have greatly differing instructional practices compared to their non-LA colleagues. This finding suggests being an LA might be foundational to the formation of more advanced pedagogical decision-making.
LAs identity formation becomes salient as they develop their pedagogical decision-making skills and impact student outcomes. LA identity has been investigated through a community of practice (Lave & Wenger, 1991; Wenger, 1998) lens to evaluate how being an LA impacts identity as well as how they create experiences for students that foreground collaboration and active learning (Close et al. 2013, 2016). Close et al. (2013) discuss how the formation of a community of practice contributes to an LA’s personal interests, student performance, competence, and recognition by others as a “physics person.” These findings are expanded upon in Close et al. (2016) to discuss how LAs reconcile forms of membership in the varying communities of practice they are a part of being students and teachers. In this developing identity, LAs navigate the classroom and reconcile the roles of student and teacher.

From the literature cited above, we can infer LAs improve student outcomes, in part, through their decision-making practices. These types of practices are supported by the pedagogy seminar and may be different from the practices that have been valued as students. Practice and identity are closely related and LAs must negotiate being members in student and instructional communities. Understanding how LAs navigate classroom culture and contexts can help us better understand why LAs positively impact student outcomes as many empirical studies have cataloged specific outcomes, but the mechanisms of how these impacts are understood are still largely unidentified (Wendell et al., 2019).

As developed in the next chapter, in this work we take discursive lens: LAs, being both students and teachers, encounter and take on different discursive identities within the classroom. From these different identities, LAs negotiate between contrasting pedagogical choices. These discourses then influence their pedagogical decision-making as to how to best help students with content (disciplinary knowledge) by integrating the ideas from the pedagogy seminar.
(pedagogical knowledge) and their student experience in the classroom. Although the literature has addressed pedagogical development in various manners, the LA literature has yet to explicitly focus on interrogating the dialogic conversation LAs have when considering their identities as students and teachers. LAs must navigate teacher and student discourses and frame sensemaking in the STEM classroom. The tensions among the discourses can reveal a discrepancy between how instruction is perceived from the student lens and the instructor lens. Instructors may have a pedagogical vision that they generate regarding their teaching; however, it is through a different discourse that this vision could become lost to students. In this work, I intend to investigate what kinds of practices LAs bring to their instructional moves due to this dialogic conversation between their discourses as expert students and discourses as novice teachers.
Chapter 3. Conceptual Framework

Conceptualizing Classroom Culture

In Western society, the worlds of student and teacher have been made different as hierarchies in schooling systems that have historically created a student’s position as an “empty vessel” in which teachers place knowledge into students - like filling a vase with water. Friere (1970) called this view the banking model of education. However, both students and teachers act as agents in the classroom’s cultural space. Both come in with varying histories, identities, values, and experiences that impact classroom interactions. The separation of student and teacher inherent in the banking model does not work to support all students or even to support all teachers.

Culture is central to the idea of a classroom space where students and teachers act as agents, or active participants. The meaning of culture has evolved as psychologists and anthropologists seek to describe what the process of culture entails. I will use Anderson-Levitt’s (2012) reconciled definition of culture, “the making of meaning – meaning being beliefs and norms, understandings and know-how, or ‘knowledge’ very broadly defined” (p. 443). Culture is an active, ongoing process that impacts all interpsychic and intrapsychic aspects of social situations. This dynamic definition of culture means that it does not act on anyone or “do things” to people. Students and teachers actively create the culture within the classroom as they work to make meaning and construct knowledge. Building on this concept of culture, I next introduce the idea of discourses as ‘ways of being’ that include the rules, norms, and actions within specific communities.
Discourses as ‘Ways of Being’

Discourse is typically seen from the lens of the languages people use on a daily basis. However, language use is a cultural process that is impacted by the contexts, histories, and identities of those involved. Gee (2012) describes Discourse with a capital “D” (or “Big D Discourse”) as a distinctive way of being in social activities that exist as a “saying (writing) - doing - being - valuing - believing combination” (p. 148). On the other hand, discourse with a lowercase “d” is less broad and focused on language. For brevity, “Big D Discourse” will simply be written as “discourse” in this paper. Gee (2012) discusses a “tension” or “conflict” among discourses that occurs when individuals try to navigate fluency in their primary and secondary discourses.

Progressive approaches to teaching pedagogy and praxis view students as having agency and rich histories and identities that must be cherished in the classroom. However, STEM students come into college with heavily ingrained ideas about what entails the “performance” of doing well in classes. Thus, progressive pedagogical visions can become lost to students because of larger systemic and institutionalized discourses so deeply ingrained within the academy. In this work, I define student discourses as the ways students interact, think, feel, and create meaning within the classroom in their role as students. Within our context, students have often experienced classroom cultures based on the banking model. These experiences inform and create a primary academic discourse for students. Such discourse provides a way to act, think, gain validation, and belong. However, it can become a force of inequity when a primary discourse doesn’t allow for varying expressions of competence. I define teacher discourses as the ways that teachers interact, think, feel, and create meaning within the classroom in their role
as teachers. Within our context, the use of teacher discourse is reserved for practices emphasized in the pedagogy course where LAs learn about student-centered responsive pedagogy and praxis.

Gee’s accounts of discourse have been criticized as having elements that are deficit-oriented and that associate a negative portrayal of discourse acquisition, particularly for students of color. Delpit (1998) provides two critiques of Gee’s work. First, she expresses discomfort with his view that discourses cannot be overtly taught, or in other words the assertion that if you aren’t in the discourse community you cannot get in. Secondly, she finds his claim that marginalized people experience “major conflict” when trying to acquire dominant discourses as problematic because it makes teachers think that this “self-deprecatory” process is inevitable which may prevent them from helping their students acquire the primary discourse in the name of justice and equity. She emphasizes that students can find different voices and gain the skills to learn and gain access to the primary discourse community without forgetting their own discourses. These alterations to Gee’s work are important to consider ensuring that our views on navigating discourses do not further hurt students who already may be marginalized.

In summary, communities use discourses to construct norms and define and frame common knowledge as well as allow people who hold power to invite or limit the participation of others (Kelly, 2010). In particular, academic discourse is a linguistic and sociocultural process in which members of a school-based community are socialized through language and socialized to particular valued forms of engagement (Gutierrez, 2009), as discussed next.

Student Discourse

Students acquire their primary student discourse through their histories, identities, contexts, and experiences. Through their experiences in school, most students have been accustomed to a specific form of academic discourse (Gutierrez, 2009; Kelly, 2010; Kobayashi et al., 2017). This
discourse centers on narrow forms of competence as demonstrated by good grades, correct responses to single right-answer questions, and how quickly an answer can be produced.

Discourse communities can create and perpetuate such narrow definitions of competence and success. Additionally, the academic discourse that students are accustomed to narrowly links discourse competence to academic competence putting students whose dominant discourses more closely align with these competencies in an advantageous position. This can impact engagement in classroom discussions from students who don’t feel like they are as competent. Such discourses are central to issues of social justice since they often reinforce standards of whiteness and cultural hegemony. Within STEM especially, the de-politicized discourses around what STEM means heavily contribute to what students think about their place within the field.

Studies have also focused on the forces that propel academic discourse socialization (ADS), which Kobayashi et al. (2017), defined as the “means by which newcomers and those they interact with learn to participate in various kinds of academic discourse in their communities and other social networks” (p. 239). They outline the various means of language socialization largely used in higher education which include speech events (e.g. discussions and studios), written responses, and computer-mediated learning. They also discuss and summarize the major themes covered in ADS research which include the roles & types of socialization agents, intertextuality, entextualized humor, learners’ trajectories, and semiotic resources used in mediation. They argue that longer, more longitudinal studies are needed to understand ADS within and across courses/programs and a more critical examination of dominant ADS processes is needed as well.

When using the terminology “expert student” in this study, I refer to the idea that students have been acclimated to primary discourse that involves taking on the language, values, and
practices of being in a classroom as a student. In this framework, an expert student does not refer to any specific kind of academic performance.

**Teacher Discourses**

Teachers in post-secondary settings interact with learners in a classroom environment in different ways (Riebe, Girardi, & Whitsed, 2016; Stentiford & Koutsouris, 2021). When referring to teacher discourses, we do not intend to cover this wide variety, but rather focus on the ideas, theoretical frameworks, and pedagogical practices that are specifically emphasized in the LA pedagogy course. Within the LA pedagogy seminar, LAs are prompted to think critically about responsive teaching and sensemaking, as well as diversity, equity, and inclusion. Thus, in this work, we refer to a specialized and idealized form of teacher discourse, emphasizing collaborative and student-centered pedagogy and practice, which is not necessarily common in university STEM courses.

These teacher discourses consider how to effectively use teacher talk moves to question students (Cazden, 2001; Ford-Connors et al., 2017; McElhone, 2013) and elicit sensemaking (Doyle, 1988; Koretsky et al., 2018; Lampert, 1990; Schoenfeld, 1988) in ways that also support student agency and authority (Engle & Conant, 2002). Other ideas explored in the pedagogy seminar include discussions about academically productive talk (Michaels and O’Connor, 2012), using failure as a productive learning tool (Kapur, 2014), and using misconceptions as useful tools to make sense of the world (Campbell, Schwarz, and Windschitl, 2016).

The LA pedagogy seminar also discusses pedagogy to make sure to not replicate discriminatory social practices. In this particular iteration of the pedagogy seminar, LAs are asked to read a paper about a scenario in which non-standard language use in a science setting is not accepted by the other students or the teacher (Kurth, Anderson, & Palincsar 2002).
Additionally, they are introduced to ideas about the relationship between perceptions of competence, social position, and status, leading to status interventions and multi-ability treatments (Horn, 2014). Underpinning these ideas are culturally relevant pedagogies (Gay, 2018), culturally responsive pedagogies (Ladson-Billings, 1995), and culturally sustaining pedagogies (Paris & Alim, 2017) that seek to reimagine a classroom space where all students belong.

When using the terminology “novice teacher” in this study, I refer to the idea that through the pedagogy seminar, LAs are asked to engage in a secondary discourse, a student-centered pedagogical discourse. LAs are all actively learning about what a specific way of teaching in STEM looks like. Learning about this involves uptake of a potentially new set of practices, values, and other thoughts about teaching.

**Borderland Discourse**

Gloria Anzaldúa’s Borderlands *La Frontera* (1987) serves as the conceptual basis for borderland discourses. Anzaldúa uses her experiences as a “border woman” straggling between Mexican and Anglo cultures as a stepping stone to discuss what it means to live in landscapes between various cultures. Ideas of being at the border and working towards acquiring borderland discourses has been applied to teacher education to describe how pre-service teachers apply discourses that are both their own as well as those that they are actively learning about (Rijswijk, Akkerman, & Koster, 2013). These hybrid discourses which are made up of ideas which are “half theirs – half ours” (Bakhtin, 1981, p. 345-346) have been described as borderland discourses as they encompass being at the “border” of several experiences and trying to make sense of them within their own identities as teachers. In this study, being novice teachers and
expert students, we envision LAs utilizing both student and teacher discourses in their instructional practice.

With these ideas in mind, we can see that the dynamic of dual discourses provides a lens to investigate how LAs navigate their instructional space. Discourses are used as ways to navigate social worlds as they encompass ways of being within various contexts. Students and teachers enter conversational floors with discourses that inform their learning and engagement. We say that discourses are ‘inhabited worlds’ because these moves undertaken by LAs in the classroom are used to create social interaction which produces social actions as well as mediates aspects of their identities. LAs embody what it means to be a student learning about teaching as a social, cultural, historical, and anthropological activity.
Chapter 4. Methods

Overall Research Design

Thematic analysis (Braun and Clark, 2006) was used to interrogate the different discourses that LAs have around schooling within their written reflections. Outline the steps of thematic analysis as the following:

1. Familiarizing oneself with the data
2. Generating initial codes
3. Searching for themes
4. Reviewing themes
5. Defining and naming themes
6. Producing the report

Thematic analysis is useful for these research questions because it helps us as researchers organize and describe the data set to identify, analyze, and report patterns or themes. Within my analysis, I mostly focused on steps 3 to 6 as the coding paradigm was established by previous collaborators. With the framework of discourses in mind, the data was searched to create themes around the LAs’ expressed beliefs of schooling. This method makes it possible to identify many forms of discourses (Hodges et al., 2008) as well as to view discourse as a social practice (Fairclough, 1992). Within my process, I used principles specific to critical discourse analysis (CDA) to support the discovery of themes.

Discourse analyses can occur on micro- and macro-levels. These involve 1) semantics/language, 2) social context, and 3) theoretical interpretation (Mogashoa, 2004; van Dijk, 1993). On the macro-level, CDA principles can be used to analyze written statements from LAs and interpret their beliefs to connect to the social context of a classroom as well as
formulate a general theoretical interpretation of LA identities. CDA is specifically useful for this analysis as education settings reproduce social relations and stimulate identity formation (Blommaert & Bulcaen, 2000). For the purposes of this analysis, the lens of thematic analysis and underlying principles from CDA were used to generate ideas around discourses and their relation to schooling.

**Participants and Setting**

The LAs studied here were part of the Oregon State University (OSU) LA Program. The OSU LA Program began in the Biology department within the College of Science in 2014 as a part of the larger organizational change initiative *Enhancing STEM Education at Oregon State University* (ESTEME@OSU). By 2017, the program had spread to multiple departments across the colleges of science and engineering (Cao et al., 2018). The larger study aims to gain insight into LA beliefs and the uptake of the LA program at OSU.

This study investigates written reflections from two cohorts of undergraduate LAs. The first cohort participated in the LA program before the COVID-19 pandemic in Fall of 2019 and taught students in person. It included twenty-six undergraduate learning assistants who were part of an in-person 10-week LA pedagogy seminar. The second cohort participated in the LA program during the COVID-19 pandemic in Fall of 2020 and taught remotely. It included 18 LAs who were part of a remote 10-week LA pedagogy seminar. All LAs were chemical, biological, or environmental engineering students. Most were first-time LAs who were concurrently teaching, but a few were preparing to teach for an upcoming term. All participants consented to have their written responses used as part of this study.
Data Collection

Qualitative data used in this study consisted of written reflections collected through the Concept Warehouse (CW), an online concept-based active learning tool (Koretsky et al., 2014; Koretsky, 2020). Every week LAs were asked to read a paper focusing on pedagogy and instructional practice. Week 1’s response was a reflection to a paper by Goertzen et al. (2010) who discussed the importance of centering TA development on the beliefs they bring into the classroom.

The prompt given to LAs during Week 1 was:

In this week's reading, Goertzen, Scherr, & Elby, argue that responsive TA (or LA) professional development should center upon the beliefs you bring to this work. Think about teaching and learning in the environment that you are working in as an LA (e.g. studio, lab, ...). Identify two or three strong beliefs that you have about your role to support learning in that environment.

Additionally, the prompt given to LAs during Week 10 was:

Over the term, many of you have had the opportunity to interact with students in class and we have all had a chance to discuss and reflect on this aspect in the pedagogy class. Think about teaching and learning in the environment that you are working in as an LA or as a student (e.g. studio, lab, ...). Identify two or three strong beliefs that you have about your role to support learning in that environment.

The premise of the prompt to “Identify two or three strong beliefs that you have about your role to support learning in that environment” remained identical between Weeks 1 and 10 to not only inform us about the LAs’ salient beliefs but also how those may have shifted through the term.

The CW anonymized the student responses with computer-generated identifiers to further protect participant confidentiality. Responses were not graded, but feedback was provided by Author 3 who was also leading the seminar. The purpose of this feedback was to further promote discussion among LAs during the following seminar.
Coding and Analysis

Thematic analysis centering discourses as social tools was used to formulate and operationalize the processes LAs use to negotiate between the different beliefs they hold around their roles in the classroom as student-instructors. Multiple iterative steps within the coding and theme formation processes were taken to understand and develop salient beliefs LAs held in common and their implications.

The first and second cycles of coding were done by Brandon Jeong, a student at Oregon State University, reviewing LA written responses for his honors thesis, and our advisor, Milo Koretsky which involved generating codes based on the LAs’ expressed beliefs. They met regularly to discuss the progress on qualitative analysis, refine the code book, and discuss trends in the data. I joined the team during the latter part of this process and participated in coding sessions. The second cycle of coding involved shifting and evolving the coding practices to better address the research questions of the overall study. These ideas of common beliefs were split into goal-oriented and action-oriented belief elements that codes were placed into to further characterize LA beliefs. Goal codes involved what LAs sought to do to support student learning, while action codes focused on the specific steps LAs used to carry out this support. Once a stable set of belief elements were generated, we identified groupings of core themes. Five core themes emerged:

1. **Student Thinking** - LAs seek to find different ways to support student thinking.
2. **Instructional Climate** - LAs seek to build a positive instructional climate.
3. **Group Work** - LAs express the importance of helping maintain group dynamics and social positioning
4. **Feedback** – LAs, and learners participate in interactions that directly lead to learning.

5. **Course Content** - LAs leverage their previous experience in the course and course objectives defined by instructors to inform their instructional moves.

I completed the third cycle of coding on data from the Fall of 2020 based on the existing codebook. I verified coding with Brandon to establish interrater reliability. This collaboration continued until all inconsistent coding was fixed and mutually agreed upon. Next, I used the codes to generate ideas regarding practices students and teachers have in the classroom. These ideas were reconciled in terms of their instructional goals and instructional actions and reported here as orientations within student and teacher discourses.

The study reported in this thesis examines the Student Thinking theme as a phenomenon was observed where LAs engage in a dialectical negotiation of objectives when choosing how to respond to students’ questions during the problem-solving process. We interpreted this negotiation as stemming from the LAs being both expert students and novice teachers. In our analysis, we aim to discuss the negotiation in the context of students navigating their dual discourses as student and teacher. Evaluating these dual discourses unveiled specific epistemic practices they hold around schooling and engineering practice. We seek to understand how LAs make meaning of their various social roles and how they enact that within the classroom.

All LA responses within the results and discussion have been presented verbatim other than the exclusion of clear grammatical errors. Additionally, to make the presentation of results more straightforward and maintain the anonymity of all participants, gender-neutral pseudonyms are given to all LAs.

*Researcher Positionality*

Our researcher positionalities shape how we see the social world and inform our lens of analysis (Miles, Huberman, & Saldaña, 2013). I identify as a South Asian American, first-
generation, queer, cisgender male. I have a BS in Chemical Engineering and am currently pursuing an MS in STEM Education and Ph.D. in Chemical Engineering. Although not technically a learning assistant at my undergraduate institution, I was an undergraduate teaching assistant for several chemistry, chemical engineering, and first-year experience courses. This work afforded me experience in developing curriculum and learning about assessment practices. My fundamental aims to build inclusive spaces that foster active learning are similar to those expressed in the LA model. These experiences also have given me insight into a LA’s positionality as a student-instructor on a more personal level.

Validation

Qualitative research requires a rigorous methodology to ensure credibility and trustworthiness as the researcher acts as a sociohistorical interpreter who co-creates meaning within the context of the subject matter (Creswell & Poth, 2008). Angen (2000) discusses how validation involves engaging in a constant conversation or “dialogue” with the data. We achieved this by using multiple coders to improve our interrater reliability. About one-third of the way into the project, Deja Preusser, an undergraduate chemical engineering student at OSU, joined the team for weekly meetings to provide an independent perspective. I joined the team in May 2021 to provide another independent perspective as an undergraduate teaching assistant in chemistry and chemical engineering courses at the University of Illinois at Urbana-Champaign. Findings were regularly discussed at weekly research meetings. Additionally, any disagreements regarding the coding or data analysis were frequently addressed and resolved by consensus, leading to iteration, and continued refining of the code book and any conceptual categories. Multiple iterations of the coding process with evolving dialogue regarding the data ensure that the analysis process maintains the credibility and trustworthiness involved in the substantive validation.
process (Creswell & Poth, 2008). To reinforce ethical validation, we continually engaged in self-reflection and conversations regarding our positionality and how it influenced our analysis of the data to make sure the voices of the participants were centered in our minds.

Limitations

All participants were engineering students from the same program which limits the perspectives of students to that common experience. They were also all in the same pedagogy course so they frequently shared ideas. Additionally, they were not all LAs for the same course. However, it is important to note that all LAs were involved in courses within the College of Engineering and thus were similar/related in the topic.

These beliefs are self-reported. Their beliefs may not represent their actual capability as teachers and rely heavily on self-perceptions. LAs may have imposter syndrome where they may not express values and beliefs they use in teaching as they don’t have the self-perception of being a “good teacher.” Conversely, an LA may express a belief or value regarding teaching but not carry it out. Finally, demographic data was not collected for this study.
Chapter 5. Findings

Overview

To address the first research question, I describe the LAs’ views of their positionality as near peers. Their positionality leads to ideas about what students do and what teachers do. To address the second research question, I describe two distinct types of orientations in the LAs stated beliefs:

- Transactional orientation: negotiation regarding the importance of validating and providing correct answers.
- Constructive orientation: negotiation regarding how reasoning, sense-making, and collaborative discussions lead to learning. These negotiations can be approached through asset-based or deficit-based lenses.

These orientations arise from and are based on the LAs previous and current experiences as learners (student discourses) and their emerging experiences as instructors (teacher discourses). Student–teacher discourses can be characterized as a borderland discourse that lies at the boundary between student and teacher. LAs co-construct this discourse with those around them like their pedagogy seminar instructor, content area instructor, other LAs, students, and other members of their communities. We see that this co-construction of borderland discourses calls upon the LA’s personal experience as well as the new ideas regarding pedagogy and practice. Furthermore, I observe that LAs create and prioritize student discourses, teacher discourses, or a hybrid of the two. In this study, I mainly focus on orientations that remained the same from the beginning of the term and the end as well as those that appear common between in-person and Zoom teaching. A systematic study of differences in orientations between Weeks 1 to 10 and between in-person and Zoom teaching is warranted in the future.
LA Positionality

LAs, for the most part, were aware of their social position as near-peer instructors. Although their interpretations varied about how they should engage in the dual role of serving students and instructors as near-peer instructors, LAs all share ideas about being approachable and serving a different role than instructors or graduate teaching assistants. Furthermore, LAs begin to become positioned as agents of change within the classroom because of their dual roles as students and teachers. The nature of these dual roles allows LAs to perturb aspects of their classroom communities. We argue that through LAs creating and navigating their positionalities, they create various ways of seeing the world. These ways can be thought of as “student discourses” and “teacher discourses.”

Common Classroom Experience

LAs express their unique positionality by citing their previous experiences as a student in the same course that they LA for and in the program’s curriculum. For example, LA Charlie discusses how they act as a “middleman” by using their previous experiences as a student.

Over the course of fall term as a learning assistant, I understand that my position acts as an easy middleman between teaching from a professor to student learning, who has knowledge of what students are going through to provide them with better ways to learn the material or focus on what truly matters for the rest of their classes and after graduation. Since I previously took the course I am helping with, I am able to help students through pitfalls I ended up finding in coursework, and help them through while allowing them to convey their understanding so that they will not need too much assistance with work. Being able to have students understand the process of solving problems and explain their answer itself is a useful skill that can be used in other fields, so providing them with this help is great for both me and them.

LA Charlie mentions how they have a unique perspective in that they have “knowledge of what students are going through” and using their experience can “focus on what truly matters for the
rest of their classes and after graduation.” LA Charlie uses their experiences to understand the students’ experiences with the intent to create an environment that will help them with problem-solving in both the current class as well as the future because they know the way they carry out instruction can provide skills that can “be used in other fields.”

LA Ember talks about their experiences in a third-year chemical engineering course.

One of my first strong beliefs is that the types of assistants whom we define as ‘LAs’ (namely students who have gone through the exact course previously) are absolutely integral to environments where the goal is to solidify concepts presented in the course. So, for example in [third-year chemical engineering course] these would be the studios/recitations (or tutorials in the paper). GTAs [graduate teaching assistants] are great in helping introduce material and assist in the actual teaching, but in my experience having assistants who have seen the actual material as generally presented in CBEE [School in which the LA Program resided] (realizing some may differ between years of different professors slightly) helps varying the types of ways to approach the material. They can better empathize as they understand the limitations they had when in the students’ position than a GTA because the GTA is typically limited by their previous experiences from their undergrad. LAs inherently have more overlap of previous experience and therefore help students connect with the pedagogy as we frame it at OSU.

LA Ember notes how even though GTAs are good resources for helping with material, the benefit of LAs who have actually taken the course with the same instructor can help “vary the types of ways to approach the material” because they “understand the limitations they had in the students’ position.” It is a way to also provide an empathetic viewpoint towards the student. Ember believes the ability to frame knowledge in this way allows the student to have a deeper understanding of it.

LA Keegan emphasizes a similar idea to utilizing their previous experience and how it impacts the instructor-GTA/LA dynamic.
I believe that LAs are an important part of the learning process for students. Sometimes the professors who lead the classes learned the material so long ago and have acquired so much knowledge since then that their current thinking is drastically different than that of the student. This can lead to the professor forgetting what it’s like to learn some of these concepts for the first time and prevents them from breaking down the material into digestible pieces. LAs and TAs help bridge that knowledge gap between students and professors as they have more recently learned the material for the first time and may have a closer way of thinking to the students. So, if a student has a question about a topic, I think that then presents the opportunity for LAs/TAs to explain it in a way the professor has not iterated and possibly in a way that the student can more easily understand.

LA Keegan also makes it a point to mention the role of experience and compiled knowledge when responding to students who struggle with the material. According to Keegan, instructors may have learned the material so long ago and forget that “their current thinking is drastically different than that of the student.” LAs and TAs have ways of thinking that are “closer” to the way that students think. Their more recent experience as students helps an LA to bridge “knowledge gaps” which is a major part of an LA’s positionality in LA Keegan’s eyes.

LAs generate student discourses from these shared classroom experiences because of how actors, artifacts, and practices have shaped the worlds of LAs before becoming teachers. This gives way to using their positionalities and shared classroom experiences to manifest teacher discourses that inherently focus on what students “go through.”

**Power and Approachability**

As LAs navigate their experiences as students and teachers, they encounter complex power relations within the classroom. LA Parker discusses their strategies for minimizing power differences.
I believe that an LA has a different role from the professor, and should serve as an informed peer rather than an authority figure. When there is a great power difference between the LA and the student, it becomes difficult for the student to ask questions and feel that their responses are valued. It's important that the LA provides separate resources from the instructor. Working with an LA allows for a different experience for the student than does going to lecture or office hours. An LA should create a comfortable environment for brainstorming and problem-solving.

The nature of interactions in which LA Parker wants to involve themselves makes sure that working with an LA becomes a different “experience” because the LA will provide “separate resources” from the instructor. Through creating comforting spaces for brainstorming and problem-solving, the LA can establish their positionality as an “informed peer” with minimum power differences.

LA Austin emphasizes that their role is more aligned with acting like a peer rather than a professor.

LAs made the learning much more personable and I felt as though I had someone I felt comfortable with asking questions, especially since professors can sometimes be intimidating. The great thing about LAs is that they’re about the same age as their students and they recently took the class. I want my students to find me approachable and I want them to feel like they can ask me anything. I hope to be a friendly and helpful face in what might be a challenging and intimidating learning environment. When I am in their breakout room, I don’t want them to see me as an intimidating academic authority figure; I want them to see me as a student, just like them, who just already happened to have taken the class.

Approachability for LA Austin is created because LAs are “about the same age as their students and they recently took the class.” This makes the LA a “friendly and helpful face in what might be a challenging and intimidating learning environment.” LA Blake expressed similar ideas about connecting with their students on a personal level because they see themselves as a “peer.” They use this approach to maintain “no sense of superiority” over their students and create
welcoming work environments. Furthermore, LA Ryan extends these beliefs about approachability to create a role where the LA acts like a “friend you had growing up who was a year or two ahead of you in school.” LA Drew even uses the extreme metaphor of a “fellow soldier on the battlefield.”

Ultimately, supporting learning is an endeavor that begins with recognizing the student as a whole person and joining the student as a fellow soldier on the battlefield rather than as a distant king in a castle, and this is true more than ever as the battle intensifies and Zoom brings unique challenges against both student and instructor.

LA Drew describes the process of learning as a “battle.” The distinction between a “fellow soldier” and a “distant king in a castle” is used by LA Drew to express their closeness to the students as a learner. This metaphor can also speak on behalf of seeing learning as a process filled with multiple power dynamics that can obstruct viewing the student as a “whole person.” The positionality of LAs can minimize these various power dynamics that LA Drew highlights with this metaphor.

LAs have experienced power inequity firsthand and these student discourses become ones of learning how to navigate them while becoming comfortable and confident in their abilities as learners. This prompts a teacher discourse to include instructional moves focusing on minimizing power differences and gaining approachability.

**Codifying Orientations**

To develop ideas about orientations, the following codes in Table 1 were chosen after analyzing the qualities of transactional and constructive processes. The codes associated with transactional orientations all involve a ‘transaction’ in the classroom, which we define as when an aspect of an LA’s instructional move involves them doing something in return for either the
LA to receive something back (trust, confidence, etc.) or for the student to receive something (knowledge, resources, etc.). In this process, the transaction is equal as the students receive direct access to pieces of knowledge or other resources that are valued within the classroom setting.

The codes involving constructive orientations are associated with constructivist and responsive teaching strategies which include themes from the pedagogy course (student-centered pedagogy, inclusion, productive failure, etc.).

Table 1. Codifying transactional and constructive orientations using goal and action codes

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<thead>
<tr>
<th></th>
<th><strong>Transactional Orientations</strong></th>
<th><strong>Constructive Orientations</strong></th>
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<tbody>
<tr>
<td><strong>Goals</strong></td>
<td>Mutual Trust, respect, and approachability</td>
<td>Mutual Trust, respect, and approachability</td>
</tr>
<tr>
<td></td>
<td>Near peer positionality</td>
<td>Near peer positionality</td>
</tr>
<tr>
<td></td>
<td>Student confidence in their answer</td>
<td>Student confidence in their answer</td>
</tr>
<tr>
<td></td>
<td>Verify student correctness</td>
<td>Get students unstuck</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Preserve student authorship</td>
</tr>
<tr>
<td><strong>Actions</strong></td>
<td>Answer questions directly</td>
<td>Connect to prior knowledge</td>
</tr>
<tr>
<td></td>
<td>Confirm student correctness</td>
<td>Guide student thinking / problem solving</td>
</tr>
<tr>
<td></td>
<td>Provide explanations / show procedures</td>
<td>Leave the table before complete understanding</td>
</tr>
<tr>
<td></td>
<td>Provide resources and information</td>
<td>NOT give answers to assignments</td>
</tr>
</tbody>
</table>

Three of the goals from both orientations overlap which will be explored further in the discussion. This shows an important relationship between transactional and constructive orientations, in that the goals when using these orientations to generate instructional moves are generally similar; however, the actions used to carry out these goals within the orientations vary vastly.
Student discourses arise from the positionalities of LAs and these allow them to view the student holistically with ideas like power, approachability, and common experiences in mind. Their positionality prompts the formation of a teacher discourse that prioritizes instructional moves that emphasize that LAs are students too. This promotes deeper understanding and connection. This generation of this borderland discourse which lies in between their experiences as expert students and novice teachers elicits the negotiation between several orientations regarding teaching and sensemaking in which LAs must engage. Transactional and constructive orientations can be a part of both student and teacher discourses. These orientations contribute to the challenge of navigating the worlds of both student and teacher.

**Transactional Orientations**

In this section, I will consider how LAs formulate their discourses around sensemaking as a transactional orientation. I observe a central theme around how they organize these discursive identities using transactional orientations. This orientation primarily includes the validation or being more direct about correct answers so that it allows students to go in the right direction for problem-solving and gain confidence in themselves as problem-solvers. Transactional orientations concern themselves with products of activity. There is an inherent value attached to a correct answer or pieces of knowledge that can lead a student toward a correct answer. Teachers are sometimes seen as the owners of this knowledge who have the power to dispense it. LA Remy discusses their experience regarding correct answers.

One thing I personally won't do (since I don't like it when it is done to me), is to not confirm student's correct answers. This is because as a student when I ask if my answer is correct it is so I can help my fellow classmates while making sure I am not steering them in the wrong direction.
Based on their experiences, LA Remy views that having an incorrect answer is a disservice to their classmates. The correct answer carries an important role in the problem-solving process and is of great value to this LA. This view of correct answers is pivotal to LA Remy because if a student has a correct answer, they can be a useful member of their community by steering other students in the right direction. Presumably, if the student doesn’t have a correct answer than they would not be able to help their peers. The student without a correct answer loses their agency and power on the conversational floor. LA Remy’s student discourses lead their beliefs and instructional moves based on what they felt was important as a student.

LA Kyle describes interactions they’ve had in studio sessions and how the lack of validation of correct answers can be frustrating.

I’ve often found the lack of straightforward answers to questions I’ve asked in studio to be more confusing than inspiring. After some classes, I would leave feeling very self-doubting because I didn’t believe in either my knowledge of some principles/concepts or my skills in coming to those conclusions. Therefore, one of my beliefs is that you should answer a question asked. One of the ways my instructors framed it is that practice does not make perfect but it does make permanent. If you practice an incorrect method of reasoning too much, you will have a hard time grasping the concept. I am a firm believer in being part of a conversation to discuss the answer, but before you leave a table, the team should have the correct answer to their question. This also leads to having the answers for studio worksheets, because students should be able to practice the concepts correctly.

LA Kyle made sure to take his experience as a student and apply it to their instructional moves at the beginning of the semester. They believe that the place for a correct answer is “before you leave a table.” Additionally, LA Kyle uses the negotiation of objectives regarding the validation of correct answers to situate students in a more holistic view of their cognitive processes which involves building confidence and positive self-perception. At the end-of-term reflections, LA Kyle still holds similar beliefs in terms of how to help students, but some fundamental things
have changed regarding *when* the transaction should occur. They now say that, at times, it might be better to wait until the “end of the studio” session to provide the answer, thereby giving students a chance to work through and develop their own conceptual understanding. LA Kyle now thinks about how some of the conceptual questions in studio might require students to ‘work through in the class period.’ LA Kyle undergoes a shift within their discursive identity. At the beginning of the term, they drew from their experience as a student where they “felt like [the LA] wasted my time.” Towards the end of the term, LA Kyle mentions a reform that is influenced by their experiences as an instructor shifting towards a more hybrid discourse. These different responses suggest a negotiation that LAs go through regarding their experiences as a student and an instructor.

**Trust Through Transactional Orientations**

LAs find trust and respect critical to teaching. However, the ways LAs think they can earn trust and respect differ based on their orientation: transactional or constructive. For some LAs, transactional orientations inherently foster trust between themselves and students. If we return to LA Remy’s response and how they mention that knowing the right answer makes sure they weren’t “steering them [referring to their peers] in the wrong direction.” For LA Remy without possessing knowledge of the correct answer, a student cannot help their peers in the best manner possible. Additionally, LA Kyle’s response mentions how “[they’ve] often found the lack of straightforward answers to questions [they’ve] asked in studio to be more confusing than inspiring.” This has left them confused and doubting their ability to do well in class. Thus, they make sure that they deliver the answer to the student at some point in the class because they know it is a way to build trust with students by building their confidence.
Finally, LA River expresses how they think about helping people in office hours.

I think that this differs from office hours because the students have had more time to think over the problem before coming to me. I would tend to agree more with Alan [TA studied in the article] from the reading in this area. The students have had the time to think and struggle over the problem when they come to office hours and thus are probably at the end of their patience with the problem they are thinking on; if I were to answer their questions indirectly the may become so frustrated that they no longer trust me to assist them when they need it. Since office hours are on a more individual level, I believe that having them do the problem in front of you and correcting math mistakes or logic errors by asking them leading questions is a more productive and trust building use of time.

LA River uses their student discourse to assume that students have probably been struggling and thinking about a problem before they come to office hours. River believes office hours are a last resort for students and if questions aren’t answered directly, then students “may become so frustrated that they no longer trust me to assist them when they need it.” LA River knows that they must make a certain transaction in order to maintain trust, such as by “correcting math mistakes,” or using “leading questions” which are a more direct form of questioning. We see that LAs engage in trust-building processes by thinking about the value systems students are exposed to in the classroom and accounting for them within their teaching practices.

**Constructive Orientation**

In this section we consider how LAs formulate a constructive orientation which are part of the identities, actions, and values that LAs take on when helping students learn, build confidence, and engage in sensemaking. This orientation is centered around constructivist ideas around teaching and learning like processing, questioning, building blocks, educational histories, prior histories, and framing.
LA Maddox discusses their experiences as a student and their wishes for what an LA or TA would have given them, but then describes the shift they have after teaching for a week.

As a student myself, I have often just wished that a TA or LA would simply tell me the answer, rather than giving me the “guidance” that I have referred to, but long-term learning is not usually the result of this kind of interaction. Even after one week of studio, I have gathered that students progress more when I ask them to tell me what they already know and how they think they could approach the problem, rather than telling them the specific theory or formula they need to use. When students are encouraged to think out loud and talk through their thoughts to develop their ideas, they can be productive and actually learn the material. I think my role is to help give students confidence to follow their path of thinking, regardless of whether that is the path that I would choose. In the reading, the authors touched on the importance of understanding that not everyone learns in the same way, and that learning can occur through different paths; I think I need to keep in mind that my way of finding the answer or thinking about a problem doesn't need to be a student's way of finding the answer or thinking about a problem.

LA Maddox uses their student experience to establish a student discourse to express that they “have often just wished that a TA or LA would simply tell me the answer.” This indicates the value of the correct answer. However, even in the brief time that they have had been forming their teacher discourse, they recognize “that students progress more when I ask them to tell me what they already know and how they think they could approach the problem, rather than telling them the specific theory or formula they need to use.” This notion of progress also comes with students talking about their ideas aloud and working through them to learn, which belies a constructivist orientation to co-construct knowledge with the student.

LA Ash discusses that they work towards developing conceptual understanding by “frame[ing] the problem in a way that is familiar to them.” These beliefs arise from how they’ve “found for [themselves] when [they] can connect new content to a familiar topic it accelerates [their] understanding of it.” Their beliefs regarding problem-solving use their student discourse
to prioritize gaining an understanding of a topic through a familiar framing and lens. They then apply this framing to their teacher discourse when talking about their instructional moves as an LA. LA Ash then emphasizes a hybrid discourse as they eventually combine ideas about cognitive thinking with those around familiar frames of knowledge.

LA Jordan has a similar idea regarding helping a student navigate problem-solving.

Another belief I have is the importance in organizing a problem and taking it step by step. This is a skill that has been taught in a lot of my previous courses and one that I have found very helpful. As an LA I think it is very helpful to take a second and breakdown the problem the student is struggling with. First, it is important to identify all the information in the problem given and make sure they didn't miss anything. Then, have them walk you through the steps they have taken so far. At least for me when I do this it gives me a chance to slow down and think about the problem more carefully and potentially gain a new perspective to help me past the point I am stuck on.

Jordan notes through their student discourse that within their previous courses, LAs helped students “take a second and break down the problem” to get a “chance to slow down and think about the problem.” This set of discursive moves informs Jordan’s teacher discourse and how it relates to helping students.

LA Drew talks about their constructive orientation through analogies to building blocks and a cookie jar.

I find the base of a student's understanding and then guide them through building on that base by asking questions that point them towards the building blocks they need to gather. Sometimes, I realize that a student doesn't have a certain building block in the vicinity. In that case, I hand them the building block and let them figure out where in the building it goes.

When I teach, my first step is to identify what the student's thought process is by asking questions. From there I am typically able to discern where in their train of logic they went astray and why. Once I find that reason, I look for a way to show the student the flaw in their reasoning by questioning their logic until they
figure out for themselves why their train of thought doesn't make sense. In short, my role is not to get the jar of cookies off the shelf, but point out where the jar of cookies is and make them get it themselves. I firmly believe that if a student arrives at a conclusion themself, they will be much more able to retain the information and walk through a similar process when presented with other problems. My goal is not so much to teach a student a concept but rather teach a student how to learn a concept.

LA Drew begins this by stating that they always use the “base of a student’s understanding” which begins directly from the student’s thinking. In both cases, the student has the agency to get something themselves or put something in place with reference to their learning processes. LA Drew’s teacher discourse is established by them talking about how they help students through processing concepts because of the ability of the nature of the instructional technique being so closely related to what they learn in the pedagogy course. This instructional technique follows a constructivist approach where student and teacher work in tandem giving the student authority over the process.

LA Taylor expresses similar beliefs about their process when they have a student who is confused or encounters some misunderstanding.

Each student's understanding has gaps in it: some of these are apparent to them when they can't continue down a line of reasoning or do a step in a problem. At other times, these gaps are hidden from them, and they're able to continue with the problem despite these misconceptions. As an LA, my role is to spot these and help the students bridge the gaps. As they work in their studio groups or on their homework, they'll doubtlessly encounter a plethora of pitfalls, and each needs to be addressed in a different way. Sometimes the pitfalls result purely from lack of information. The student cannot continue the problem because they do not know the definition of relative humidity. In a studio setting, it may be appropriate to share this information with them. In a homework setting, it may be more appropriate to direct the student to a place they can find the information. Another possible source of a gap is a conceptual one. In this case it is more
helpful for me to learn what they currently understand, and to guide them to use that information to come to
the proper conclusion about the problem.

LA Taylor formulates a teacher discourse based on identifying and helping students who have
“gaps” in their understanding which block the student’s ability to continue in a problem.
Although this view of students having gaps could be viewed as negative, LA Taylor still asserts
that students have the authority to “bridge the gaps” because they will inevitably “encounter a
plethora of pitfalls.” Taylor does not see any explicit issue of not knowing something even
though they describe unknown knowledge as something as drastic as a ‘pitfall’, but with the
process, they convey using their instruction, eventually, a student is able to gain access to come
to the same conclusion once the LA makes a series of context-dependent instructional moves that
help the student gain understanding. Additionally, Taylor focuses on the value of being able to
reproduce a certain line of thought when they state, “they can again follow this line of reasoning
based on current knowledge and come to the same conclusion.”

LA Blake discusses how they have helped students in chemistry courses with different
backgrounds.
Secondly, I have learned that every student is different, and requires a different approach to
helping/instructing that can be learned over time. For example, I had some students who were evidently
very knowledgeable in basic concepts of chemistry before coming into the class, and therefore I was able to
guide them through problems in a way that used those basic understandings they already had. On the other
hand, there were some students who had little to no understanding of chemistry, which was perfectly fine
but they required a different approach to thinking through some of the problems. This is similar to the
situation presented in the handout this week, in which Josephina and Maya are two clearly dedicated,
hardworking students, and yet their educational histories and personalities contribute to very different
studying patterns and therefore their beliefs of their performances on the exam varied. Overall, this term I
have learned that all students are very different, but that doesn't make any of them any less valid as learners than any of the others.

LA Blake emphasizes this point of view that students all come in with different backgrounds and that some students may have “little to no understanding” of a certain subject. LA Blake then discusses instruction that is responsive to each student’s needs. LA Blake’s teacher discourse is influenced by a handout presented in the LA pedagogy seminar which causes them to think about how “all students are very different, but that doesn't make any of them any less valid as learners than any of the others.”

LA Emerson discusses how they became comfortable not knowing all the answers when teaching as an LA.

One strong belief that I have about my role as a Learning Assistant is that I am not there to instruct or to provide information. My purpose as an LA is to facilitate learning and collaboration, not to give answers. While I may sometimes respond to students’ questions with an informative answer, I try to guide learning and help students to draw from their own knowledge bank while solving problems. At the beginning of the term, I felt like I had to be very knowledgeable about the material covered in each studio session; now I am comfortable with the fact that I may not know the answer to every question and can learn with the students.

It is my role to be a peer and teammate, rather than a teacher.

LA Emerson expresses a shift of their pedagogical thinking within their teacher discourse in that it becomes less important for them to have all the answers. This allows LA Emerson to focus on using the student’s existing knowledge to co-construct an understanding of the problem with them.

The LAs in this section use constructive orientations to formulate their student and teacher discourses, but their conceptualizations of this orientation differ. Table 1 describes the salient elements of these orientations and how they differ between LAs. Although 7 LAs are
described in this table, these elements are representative of all the LAs in the data corpus who use constructive orientations.

Table 2. Elements of constructive orientations among LAs.

<table>
<thead>
<tr>
<th>LA</th>
<th>Processing</th>
<th>Questioning</th>
<th>Building Blocks</th>
<th>Gaps</th>
<th>Educational Histories and Prior Knowledge</th>
<th>Framing</th>
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<tr>
<td>Maddox</td>
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<td>Ash</td>
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Trust Through Constructive Orientations

As we return to trust as a relational concept, we find that one of the other modes to build trust is through a constructive orientation. LAs use these ideas around constructivism to increase the confidence of students. This increase in confidence is not only meant to show students their agency in learning but to also build mutual trust and respect. LAs use this as a dual-pronged approach.

LA Harper talks about their beliefs and how to build in respect into their role.

1. All students have very different backgrounds. I must remember that not everyone is going to be having a great day when they walk into my assigned studio times. I can’t get frustrated if someone does not fully understand concepts or goes about a problem in the wrong way. I’m a resource to them, and I need to be approachable.
2. I need to ask probing questions to teams that are struggling with concepts. I will not give them the answers, but instead I will ask them questions that should allow them to continue working on the worksheet. If they are not understanding material at hand whatsoever, I will provide them with enough
background information for them to grasp the tough concepts. Once again, I do this keeping in mind that each student is taking other difficult courses and could be dealing with other extremely difficult personal situations. I will not judge anyone simply because they do not understand a worksheet.

3. I will remind students every section about my office hours. I hope this will establish strong bonds between me, and my students. I want them to feel comfortable talking to me about the course, and I want to know how it’s going for them. I am only one year ahead and want to see them succeed. If they respect me as an LA, I will have more students at my office hours ready to learn.

When building respect and trust within their role, LA Harper mentions how they must gain respect in order to “have more students at [their] office hours ready to learn.” LA Harper places certain aspects at the forefront of their praxis like emphasizing understanding and being non-judgmental and respectful. This orientation is meant to make sure that the LA can support as many students as possible since the LA will be approachable and trusted.

Combined Orientations

Some LAs exhibit a hybrid of transactional and constructive orientations. LA Kennedy talks about their experiences with instructors using various kinds of questions to help the LA approach the problem from various angles.

My first belief is based off of past experiences I’ve had asking for help from LAs, TAs, and professors. As Alan [TA from the reading] drew upon his past experiences as a learner, I do as well when I teach. My best encounters when asking for help have involved someone guiding me through my confusion by asking me questions to think about that ultimately led to the solution. Asking a student an easier, bigger picture question, often opens up the problem more. This makes the problem seem actually approachable to the student. There are some special cases where I agree with Alan that it can be frustrating if you ask for help and don't get anything useful out of it. For example, if the question is related to math especially, it's more helpful to the student to give a direct answer on how to approach the problem.
For LA Kennedy, there are types of problems that direct answers are appropriate, such as a math-oriented question, or else the student just becomes frustrated. However, LA Kennedy also notes how processing using “questions to think about that ultimately lead to the solution” is an important part of the process to make the problems more “approachable.” This kind of cognitive processing is constructivist in nature because of the reciprocal teacher-student dialogue.

We see LA Noah engage in a similar dialogue where they negotiate between transactional and constructive orientations.

Another strong belief I have about my role is to do my best at both guiding students towards the right direction and helping the students come to answers themselves. I host office hours every week, and I've found students are often able to solve the problems themselves, they just needed a nudge in the right direction. Often times, they just need to look at a certain section of their notes. These students are new to certain skills such as using Excel. I've found that depending on the question, I change my teaching style to best accommodate the student. If it's a question about Excel, I've found it's better for the student for me to show them how to graph than for them to struggle to find the right button. If I'm in lab, however, I've found it more beneficial to pose guiding questions for the students to think more about and come to the conclusion on their own.

LA Noah notes the difference between the kinds of orientations they use with different kinds of problems. For something like Excel that involves using new skills, an LA should directly address the questions and use a transactional orientation. However, within a lab context it may be better to guide the student and co-construct cognitive processing of the problem until the student comes up with their own solution.

These combination orientations illustrate the pedagogical decisions that LAs make in response to the content they are teaching. If a student faces a procedural block, such as a math-oriented question with LA Kennedy or an Excel question with LA Noah, then a transactional orientation may be appropriate. To these two LAs, such direct support allows students to move
forward to address more advanced or conceptual topics. However, when the student approaches challenges in those topics, then they switch to a constructive orientation.
Chapter 6. Discussion and Future Work

In this Chapter, I first address how the findings reported in Chapter 5 address each research question. I then more broadly address the resulting contradictions and implications.

Positionality

The first research question asks how the LAs view their positionality in relation to enrolled students and the course instructor. I found that their identities and social position as expert students and novice teachers form the basis of the complex negotiations that LAs engage in when considering instructional moves. As exemplary students, these LAs have been able to perform well within the student role and their primary student discourse is a product of this history (Foucault 1969, 1980, 1985). However, their emerging position as undergraduate instructors participating in a pedagogy seminar adds additional context to their social position and brings new norms and values to their instructional practices.

LAs seem to have two common ways to conceptualize their positionality: middleman and overlap.

Middleman Positionality

LAs build on the common classroom experiences they share with their students. LA Charlie mentions how being a “middleman”\(^1\) in the process of learning is useful for both student and LA as “solving problems and explaining their answer itself is a useful skill that can be used in other fields, so providing them [students] with this help is great for both me and them.” This middleman position, shown in Figure 2, allows the LA to position themselves in a social position that intervenes in the processes occurring while doing active learning in the classroom.

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\(^1\) There is a gendered connotation to the word “middleman.” Based on the context of the data, the LA more generally refers to this role as an intermediary or “middle person.”
Overlapping Positionality

On the other hand, LA Ember sees their positionality not only through a cognitive lens that helps students “vary the types of ways to approach materials,” but also to establish a deeper sense of empathy for their students due to the LA’s closer “overlap of previous experience” to the pedagogies used in their classes. LA Keegan also has similar thoughts to LA Ember in that using the previous experiences they can “bridge that knowledge gap…that arises more recently learned the material for the first time and may have a closer way of thinking to the students.”

Social positions can be viewed through the lenses shown in Figures 2 and 3 as classroom experiences influence an LA’s relationship to the learning process. In the ‘middleman’ role (Figure 2), the LA is more on their own island within a more defined role which centers their social position as those of an arbiter. In the “overlap” role (Figure 3) there is a more blended definition of student and LA which both connect to the instructor and centers their social position as those of an equalizer.

Figure 2. LA positionality “middleman” with students
Figure 3. LA positionality “overlap” with students

Another major theme in consideration of social positioning is the ways LAs consider power and approachability. As seen in the findings, many LAs try to attend to the power differences between instructors and students which helps them think critically about how their experiences as expert students and novice teachers play a role in the classroom. LA Parker considers the structure and hierarchy of student, LA, and instructor and considers how these power differentials impact students and makes sure to center a resource-based approach. LAs Austin, Blake, and Ryan all take the lens of using their specific role to position themselves as a friend, leveraging their role as a near peer. LA Drew even represents their beliefs as a metaphor for a vivid power struggle on a battlefield. The power of borderland discourses gives LAs the ability to sense make at the boundary of their discursive identities leading to multiple ways to see a classroom. These ways of seeing the classroom involve those where the social positioning of someone who is in an instructor role does not have to exert power.

Their positionality inherently influences the LAs’ identity formation. As previous studies have shown (Close et al. 2013, 2016; Conn et al., 2014), how LAs make sense of their identity and its formation is important when considering how to help them navigate the dynamics of
being both student and teacher. The findings on positionality outlined in this thesis specifically show that discourse as an analytical lens help us see how LAs uptake a seemingly contradictory set of ideas (student vs. teacher discourses) because their social position requires them to think about the classroom as a more integrated space where their roles of student and teacher merge.

**Negotiations**

The second research question asks how LAs draw on their experiences as expert students (student discourses) and experiences as emerging teachers (teacher discourses) in making sense of their work as LAs. Within these discourses lie orientations that are part of the discourse acquisition process. Both students and teachers potentially use transactional and constructive orientations.

As shown in Table 1, many of the goals the LAs refer to overlap between transactional and constructive orientations: to use their near-peer positionality to build trust, respect, approachability, and confidence among students. However, we also see that some goals are not similar. For example, the verification of correct answers, a goal only for transactional orientations, pertains to a product of learning. LA Remy sees the action of confirming a correct answer as beneficial to the group's progress, as it makes sure students aren’t “steering [others] in the wrong direction.” LA Kyle maintains a discursive identity that is largely constituted of transactional orientations that focused on the action of validating correct answers but shifted when to apply this orientation by the end of the term. Their use of a transactional orientation is prompted by their experiences as a student (student discourse) when they found it irritating not to be provided a correct answer. However, as their teacher discourse emerges, they express that there may be times it is productive for a group to struggle without the benefit of the right answer, as long as the LA provides the answer by the end of the studio session. LA Kyle maintains a
transactional orientation into their work as an LA, but interestingly changes *when and how* they apply that orientation.

While many instructional goals for constructive orientations are the same as for transactional orientations, expressed actions between the two differ. The actions described for constructive orientations entail instructional moves that support responsive teaching: processing, questioning, building blocks, educational histories, prior histories, and framing to engage students in the learning process. This premise of negotiations provides insight into how LAs align student and teacher discourses, that is, the ways they think about what they know as students and what they know as teachers. Their framing of teacher discourses arises from aspects of the pedagogy seminar that they chose to take up, which in turn, depends on their student discourse. This reciprocal relationship can be understood using Gee’s (2012) framework as the uptake of a secondary discourse is dependent upon the subject’s negotiation of values and practices from their own primary discourse.

In the larger scope of this work, student discourses and teacher discourses involve the use of both transactional orientations and constructive orientations. Student discourses are related to the social practices and ideologies gained from putting on the “performance” of being a student. The LAs’ responses can lead to goals and actions that reproduce certain norms in traditional STEM education settings. Thus, we see that both transactional and constructive orientations can arise due to their role as *expert students*. There is a clear notion built in that learning is a transactional activity and certain LAs choose to reproduce this in different ways. This student discourse is displayed especially when LAs still feel that it is imperative to offer verification of correct answers. There is a transactional orientation to this discourse in that an answer is verified, while a constructive orientation is also added to this discourse when LAs chose to wait for when
this answer is verified. In the LA pedagogy course, they learn how to navigate constructivist orientations associated with an idealized “teacher discourse,” which values reasoning, sense-making, and collaborative discussions in the learning process. This is the process where they take on the role of novice teachers. An example of this teacher discourse is when some LAs make it important to make sure students engage in confusion by not directly validating or offering correct answers, or not even having the answers for some questions at all (constructive orientation). However, there are possible resources relating to problem-solving they may give to students (transactional orientation). In the end, students know how they must perform and what they will ultimately be tested on. Thus, an LA’s acknowledgment that “admittedly, as students, we need to eventually be able to find the right answer” becomes important in understanding the negotiation between student and teacher discourses.

Looking Outwards: Contradictions and Implications

Teachers may learn about student-centered pedagogies and praxis such as responsive teaching, much like how LAs learn about it. However, if students still understand education’s goals as an “answer-seeking venture” because of institutionalized norms and curricular standards, then the intentions of student-centered pedagogies and praxis become lost and efforts at responsive teaching become muddied. We see this tension when LAs see that if the goal of learning they’ve been exposed to in the past is to get to the correct answer, then their discursive identities realize that this creates an unfair power differential if they withhold an answer. We observe LAs feeling this way by stating how frustrating it was as a student when their questions were left unanswered. Some LAs know that distributing the correct answer means they understand what is valued in the world of being a student. This transaction becomes more than about providing correct answers, but about redistributing power through knowledge. However, as
they engage more and more with constructivist orientations, they grow to know ways to help students rather than simply providing the answer. This redistribution of power through knowledge is still present in constructivist orientations; however, it now presents itself as giving more ownership and authority to students’ own thinking processes.

Gee (2012) details the difficulty in the uptake of secondary discourses as there is a continuous process when trying to reconcile it with one’s primary discourses. He makes the following points about discourses:

1. They are inherently ideological.
2. They themselves define acceptable criticism.
3. They are defined in relation to other, possibly opposing discourses.
4. They put forward certain concepts, viewpoints, and values at the expense of others.
5. They are related to power and hierarchical structures in society. (pp. 158 – 159)

Both student and teacher discourses are inherently ideological as there are different parts of the performances of both student and teacher that are carried out to sufficiently ‘convey’ those roles. To avoid being an outsider within that discourse, both students and teachers also define what acceptable criticism is. While LAs might express the teacher discourse that being confused about a problem is valuable, they also know through their student discourse that there is a point where students will be evaluated by the answer they get.

More attention should be given to effectively help LAs negotiate between their student and teacher discourses, and how those lead to the transactional and constructive orientations we have identified. We hope that this analysis benefits both LA pedagogy instructors as well as any instructor who works with LAs in their course. The positionality of LAs inherently questions the
status quo of traditional STEM education settings systems which have historically placed teachers as the sole owner of knowledge and students as empty vessels waiting to be filled with this knowledge. LAs represent an opportunity to leverage both experiences as expert students and novice teachers but negotiating these different discourses can be challenging. By using the pedagogy seminar as a launching pad for LAs to experiment with this negotiation of discourses, we can hope to help them work their way through making sense of juxtaposing orientations, and to communicate those to other students at the university as well.

We provide the following suggestions for engaging in a dialogue that centers sensemaking within the pedagogy course:

- **Failure/Confusion**: Discussion of failure/confusion as productive talk
- **Correct Answers**: What is the importance of a correct answer? Why do we care so much about getting students to the right answer?
- **Near-Peer Positionality**: What do you understand about your social position?
  - Trust: How do we (LAs) build trust and rapport with students without giving them the answers?
  - Sensemaking of Identities: What about being at the border of expert student and novice teacher is important to you?

Finally, in the larger sense, I hope that this investigation can help with sensemaking around responsive pedagogy in general. LAs, those who are closer to students in social positions, negotiate around contradictions involving reform pedagogy. Thus, we expect instructors to also face similar or even magnified issues concerning the uptake of student-centered reform pedagogy amongst their students. Instructors can benefit by understanding student discourses and how they relate to the histories of those in their classroom. Although this thought seems intuitive regarding
histories involved in classroom contexts when thinking about discourse acquisition the primary discourse effectively serves as a filter for any secondary discourse acquisition (Gee, 2012; Gutierrez, 2009; Kelly, 2010; Kobayashi et al., 2017). Discourses in traditional STEM classroom environments that students have experienced can be at odds with responsive and asset-based pedagogies (Zeidler, 2002, 2016). In post-secondary STEM education settings, certain forms of knowledge are inherently rewarded (Gutierrez, 2009; Zeidler, 2002; Zeidler, 2016), which makes it difficult for any kind of reform pedagogy to take hold in the classrooms.

Instructors are encouraged think about this negotiation in the following ways:

- **Classroom Culture**: Promoting an environment where students can engage in confusion and failure as productive talk.
- **Products and Processes of Learning**: Both transactional and constructive orientations must be recognized in classroom settings.
- **Student Histories**: Students have been accustomed to a certain form of academic competence for a long time. This is not something that can be wished away or changed suddenly.
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