

More Relatable? Students' Positioning of Undergraduate Teaching and Learning Assistants in Mathematics Courses Taught by Graduate Students

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Undergraduate teaching and learning assistants (UTLAs) can support learning and students' sense of belonging in undergraduate, active learning STEM classrooms. One main goal of incorporating UTLAs into a classroom is to connect students to a peer-like instructional figure whom, it is assumed, students find more relatable. However, little is known about how UTLAs change the social dynamic of undergraduate mathematics classrooms, particularly those taught by an instructor of record who is a graduate student (GSI). I used positioning theory as a lens to understand how students locate UTLAs in instruction. I analyzed 411 undergraduate precalculus student responses to the survey question: "Do you interact differently with [the GSI] than [the UTLA]? If so, please explain." From a qualitative analysis of responses, I found that students positioned UTLAs along three storylines that have different implications for the distribution of instructional duties between UTLAs and GSIs in an active learning environment.

Keywords: undergraduate teaching and learning assistants, graduate student instructors, active learning, student perceptions

For several decades, institutions have been hiring advanced undergraduates to provide academic and social support for their peers, with positive outcomes (Barrasso & Spilios, 2021; Dawson et al., 2014; Gafney & Varma-Nelson, 2008; Whitman & Fife, 1988). These efforts are grounded in the view that knowledge is socially constructed, peer-to-peer interactions are important, and that undergraduates, as "near-peers" (Whitman & Fife, 1988, p. 5) have a unique ability to support students (Gafney & Varma-Nelson, 2008; Otero et al., 2006). These near-peer teaching models can be particularly effective in acting as change levers (Laursen, 2019) to support the institutionalization of active learning in postsecondary education.

Undergraduate teaching and learning assistants (UTLA; Jardine, 2020) are undergraduates specifically hired to facilitate active learning during lectures or recitations. The learning assistant model is perhaps the most prominent peer teaching model that specifically integrates near-peers into regular class time (Barrasso & Spilios, 2021; Otero et al., 2006). Research on this model suggests that it supports increases in students' conceptual understanding, higher-order cognitive skills, satisfaction, and sense of belonging and decreases in failure rates (Alzen et al., 2018; Clements et al., 2022; Goertzen et al., 2011; Otero et al., 2010; Sellami et al., 2017; Talbot et al., 2015). But the field is still emergent. With few exceptions (e.g., Stringer, 2023; Webb et al., 2014) most research has been in physics (Barrasso & Spilios, 2021) and to date, focuses primarily on positive outcomes. This also holds true for other models that use UTLAs. There is a specific gap in research on UTLAs in classrooms led by graduate student instructors of record (GSIs). Indeed, most research focuses on classrooms taught by faculty. Given that a key assumed benefit of UTLAs is their positioning as a near-peer, and thus as a more relatable teaching figure, it is worth interrogating this assumption in a context in which the instructor is a graduate student.

The purpose of this study is to explore how students perceive UTLAs in relation to GSIs within active learning mathematics classrooms, and what influences that perception. Toward this aim, I focus on the following two research questions:

RQ1: How did students in active learning precalculus classrooms position UTLAs versus GSIs in interactions with students?

RQ2: Why might students have preferred to interact with either the UTLA or the GSI?

Theoretical Framework

Positioning theory has been used as a lens to understand the multiple ways that faculty and UTLA interact with one another. I argue that it can also illuminate the nature of student and UTLA interactions (Jardine, 2020). Positioning theory focuses on social interactions, specifically on “the ways in which people use action and speech to arrange social structures” (Wagner & Herbel-Eisenmann, 2009, p. 2). It specifically is useful in highlighting the assumed rights and duties of people in interactions. There are three mutually determining components of positioning: positions, speech acts - or communication acts as Herbel-Eisenmann et al. (2015) suggest - and storylines (Van Langenhove & Harré, 1999). Positions are a cluster of personal attributes which determine the distribution of rights (what one is owed) and duties (what one owes others) within a certain social milieu. These positions contribute to and are influenced by an unfolding storyline, which is likely also influenced by historically, personally, and culturally significant stories (Davies & Harré, 1999). Positions and storylines imbue meaning to the ways that people communicate in an interaction. Researchers interested in the positions taken up by participants may study communication acts for patterns to identify what storylines participants may be assuming, thereby illuminating how rights and duties are being distributed in an interaction.

Although positioning theory often focuses on immanent, moment-by-moment communication acts, others have used positioning theory to analyze how people position themselves and others through narratives (Bamberg, 1997; Deppermann, 2013). Kayi-Aydar (2021) presents an analytic framework to support the identification of positioning in narratives. They suggest focusing on four components: a.) attributes and biological dimensions, b.) categorical membership, c.) storyline structure, and d) emotions. Attributes and biological dimensions include character traits and dispositions (e.g., creative, helpful). Categorical memberships refer to an individual’s membership in a cultural or identity group. Storyline structures can be identified through multiple means, including word choice, sentence structures, abrupt shifts in topic, and the introduction of new people. Emotion words include emotional states (proud) as well as words or sentences that express or imply emotion (e.g., “gross!”, “I can do it”). In the methods section I discussed how I used this analytic framework from Kayi-Aydar (2021) to help identify the storylines students implicitly followed when positioning UTLAs and GSIs through the narratives they shared in survey data.

Methods

This study is part of a larger case study of the UTLA role¹ at a predominately white Midwestern University and focuses on data collected in fall 2021. UTLAs supported two precalculus courses: College Algebra and a combined College Algebra and Trigonometry course. All students in the sections of these courses were invited to participate in a survey for extra credit. In this survey, students were asked to directly position UTLAs in relation to GSIs by answering the question: “Do you interact differently with [the GSI] than [the UTLA]? If so,

¹ Locally, the UTLAs were called “LAs”; however, a defining feature of the LA model is that students receive pedagogical training throughout the semester (Otero et al., 2006). At Midwestern, UTLAs received pedagogical training at the beginning of the semester, but in fall 2021 a pedagogy course was not offered. Thus, Midwestern University did not implement the LA model as intended in fall 2021.

please explain.” There were 411 responses to this question. I coded each of these responses as “Difference,” “No Difference” or “N/A” to capture perceived differences between student-GSI and student-UTLA interactions. In total, I classified 390 responses as either “Difference” (n=194) or “No Difference” (n=196) and included these responses in subsequent analysis. I read through these 390 responses and took analytic memos to capture factors influencing differences or similarities in student-GSI and student-UTLA interactions. Several responses were general (e.g. “we generally ask him [the UTLA] more questions than [GSI]”); however, 209 responses provided sufficient detail to be included in a secondary analysis. Criteria for inclusion were broad to include all responses that could illuminate why students perceived interactions with their GSI to be the same or different from interactions with the UTLA. For example, the response “No, I respect them both equally as an instructor for this course” was included because, although not overtly specific, this response suggests that the student positions the UTLA and the GSI in similar ways (positioning both “equally” as instructors), because they respect them as teachers.

To identify how these 209 students positioned UTLAs and GSIs in their interactions with them, I developed codes informed by my memos about factors and Kayi-Aydar’s (2021) recommended strategies for identifying positioning in texts. These codes were: dispositions, labels/categorical membership, emotions, and perceived teaching quality. See Table 1 for a summary of these codes. I then analyzed each of the 209 responses with these codes, before engaging in an axial coding process to identify related themes on how students interacted with their GSI and UTLA. I structured these themes around storylines to highlight how students positioned UTLAs in interactions. I also coded these responses for student preference, as in, their expressed preference to interact with the GSI or the UTLA (GSI, UTLA, or Other).

Table 1 Codebook for Identifying Storylines in SPIPS-M Data

Code	Definition	Example
Dispositions	Attributes personality traits and dispositions to a UTLA or GSI	“Yes, because [UTLA] seems more personable and available to help. I also like the way he explains things better.”
Labels/ categorical membership	Mentions membership in particular cultural groups or uses specific labels to describe the UTLA or GSI. This includes designations such as student, peer, woman, etc. as well as titles (e.g., professor).	“Yes, [UTLA] is closer to our age so we talk to him more often.”
Emotions	Mentions emotions arising from or during interactions with a UTLA or GSI.	“I can more easily say when I don't understand something to her and stop her while she's explaining - I feel a little rude to do that to Professor [GSI].”
Teaching Quality	Mentions a perceived teaching quality of the UTLA or the GSI.	[GSI] is better at answering questions.

Preference	Use to capture explicit preferences for the UTLA or GSI (or to indicate no explicit preference) Sub-codes: UTLA, GSI, Other	Other: “No, [UTLA] has helped me more since he's closer to our table, but we all interact the same.”
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Findings

In the findings section, I use positioning theory to share how students in active learning classrooms positioned UTLAs and GSIs in interactions with students. I present three major storylines students followed to position UTLAs and GSIs, particularly related to one another. As I introduce these storylines, I share quotations from students as well as the number of responses that the storyline draws from, as a proxy for understanding how prevalent the storyline was in the data.

Storyline 1: UTLA $\cong$ GSI

In this section I present evidence of one of three storylines: *UTLAs and GSIs only differ superficially, and thus have the same duties in interactions with students*. Evidence for this storyline came from responses in both the “Difference” and “No Difference” categories. Seventeen of the 194 “Difference” responses indicated that the only difference between their interactions with the UTLA versus the GSI was due to incidental factors, such as proximity or the initiative of the instructional figure. One student said “usually [UTLA] helps answer our questions first.” Another student said that they did interact differently with the UTLA, “just because [UTLA] sits closer to our table. [GSI] helps people on his side.” Although this student did perceive there to be a difference in how they interacted with the GSI versus the UTLA, their reasoning for this difference was tied explicitly to their location in the classroom, rather than an explicit preference for interacting with the UTLA or the GSI. Several “No Difference” responses specifically labeled the GSI and UTLA similarly, which in effect positioned the GSI and UTLA as occupying the same position (e.g., “No, I see them as both of my teachers who teach me the course material in and out of class, “No, I treat them both as my professor...”). Teacher, instructor, and professor were the most common labels in this group, but one student also referred to their GSI and UTLA as “guides” through “the journey of math class,” and another student labeled them as “mentors” to help them learn. Overall, this storyline calls attention to a group of students that did not perceive there to be any meaningful differences between the UTLA or GSI. However, these students did not provide enough information in their responses to glean the perceived, shared, duties of the UTLA and the GSI. The following storyline elaborates on these duties.

Storyline 2: UTLA $\cong$ GSI: Emotions, Dispositions, and Teaching Quality Matter

When students shared a preference for interacting with either the UTLA or GSI, they often explained their preference along three themes: (a) emotions felt during interactions (b) perceived teaching quality and (c) UTLA and GSI dispositions. Student responses related to these themes suggest that students judged UTLAs and GSIs based on a similar set of expectations, which effectively positioned UTLAs and GSIs similarly. Thus, the second storyline I present is an elaboration of the first: *UTLAs and GSIs hold similar positions, in which both have a duty to make interactions comfortable for students by having an inviting disposition and teaching content well*. Below I elaborate on each of the themes that contribute to this storyline.

Forty students discussed the emotions they felt in interactions with UTLAs or GSIs. Typically, students brought up emotions to explain with whom they preferred to interact. For example, one student said:

[GSI] makes me feel more comfortable because she is engaging and friendly. She explains the answer and why the problem works the way it does. She is encouraging and makes me feel like I can actually do the problem. [UTLA] walks around and occasionally gives the answer. However she is not very clear, and does not explain her thought process. She is reserved and does not make me feel confident in my answer.

This student positioned their GSI as someone who makes them feel and capable of solving mathematics problems. In contrast, the student does not feel confident when working with the UTLA. Other students had similar sentiments, but about their UTLA. One student shared that they felt “more comfortable asking [UTLA] questions...because he makes sure I understand the problem.” In contrast, they found interactions with the GSI “confusing” and time-consuming. Most emotions centered on the level of comfort and confidence felt by students. It was also common for students to simultaneously evaluate the teaching ability of their GSIs and UTLAs when comparing how they interact with these teaching figures².

In sum, 101 students described the teaching quality of their GSI or UTLA. Out of these responses, 61 responses focused on the ability of the GSI or UTLA to explain content or answer questions to support their understanding. One student shared that their GSI’s approach to student questions (answering questions by asking questions) was ineffective. In contrast, they perceived their UTLA to be more adaptable to their learning needs:

Yes, I believe that both are good instructors however, my interactions with [UTLA] are different because he takes my learning disability into account and bases his methods of teaching or explaining off of it. No offense to [GSI], I think he is a good teacher and works very hard but I cannot learn efficiently or effectively with his style of teaching.

Often, students positioned UTLAs as someone who provided more thorough explanations, which they valued. However, some students shared a preference for their GSI’s explanations, usually for similar reasons as those cited by students who preferred interacting with their UTLA. For example, one student described a preference for interacting with their GSI because of their focus on understanding “why the answer is the answer it is,” in-depth explanations, and scaffolding. Nine students also described how differences in the knowledge of the UTLA or the GSI impacted their perceptions of interactions with them. One student expressed a preference for interacting with the GSI because the “[GSI] knows what he is talking about usually and can help with homework and [UTLA] cannot.” Interestingly, a different student in the same section said “[UTLA] is usually more helpful with homework or workbook questions, so I ask him rather than [GSI].” Students focused primarily on how the UTLA or GSI explained content and answered questions, but some students did discuss the opportunities given to students to figure things out on their own and receive feedback.

Fifty-two students attributed dispositions that a GSI or UTLA may have to describe their interactions with UTLAs and GSIs. Most of these students described preferring to interact with someone that had dispositions which promote interactions (e.g., nice, personable, trustworthy, relatable, talkative, friendly, approachable). For example, one student described their GSI as “more personable so it is easier to have a conversation with him.” However, students also shared

² These evaluations reflect student perceptions of their interactions with instructors and UTLAs; however, I purposefully am not making any claims about the quality of the teaching by UTLAs or instructors involved in this study.

dispositions that inhibited their interactions with either the UTLA or the GSI. These included dispositions likely to result in less communication with students (e.g., quiet, reserved) as well as traits that were likely to result in negative interactions (e.g., rude, complainer). Often students used antithetical dispositions to highlight differences between the GSI and UTLA:

*If I have a question about a problem that I really do not understand, I will ask [UTLA].
He takes the time to explain things and is super helpful and patient. [GSI] always seems like they are in a rush to get to the next table or does not understand/ listen to what you are trying to ask.*

Table 2 provides a complete list of the dispositions used to describe UTLAs and GSIs when students also expressed a preference for interacting with either the UTLA or the GSI. The dispositions students ascribed to UTLAs and GSIs, and the connection of these dispositions to their preference for whom they interact, suggest that students view it as the duty of the UTLA and the GSI to be inviting.

Table 2. Dispositions Students Attribute to UTLAs and GSIs

Preference	LA Disposition	GSI Disposition
LA	approachable (2); calm; communicator; easy-going; engaging; friendly (3); helpful (5)*; kind; patient; less intimidating; chill; outgoing; passionate; personable; relatable (3)	difficult to approach; quiet; rude; rushed; straightforward; kind*; helpful*; passionate*
GSI	complainer; down to business; less engaging; reserved; nice*	easy-going; encouraging (4); engaging (3); friendly; helpful (2); nice (2); not personal but knowledgeable; personable (4); talkative; relatable; trustworthy; understanding (2)

Note. Each disposition was mentioned by one student unless otherwise noted (n)

*Three students described both their UTLA and their GSI using similar dispositions (kind and helpful; passionate; and nice) while still expressing a preference for the other teacher figure. Preference was dictated by other factors (e.g., perceived teaching quality).

Storyline 3: UTLA $\neq$ GSIs

The prior two storylines focused on duties held in common between UTLAs and GSIs. However, several students described interactions with the UTLA and GSI that suggest they perceive their roles to be different, and at times, complementary. This is distinguished from the storyline above, in which students often expressed a preference for working with either the UTLA or the GSI based on a set of common criteria. I capture this idea as the storyline: *UTLAs and GSIs have different duties in instruction*. This storyline was the least prevalent; responses from 17 students form the basis of this storyline.

Sometimes, but not always, students felt that interactions were more comfortable, easier, or less intimidating with UTLAs than with GSIs. Further, some of these students attributed this to belonging to the same community as the UTLA. For example, one student shared:

I don't act differently between [GSI] or [UTLA] but I feel slightly more comfortable with [UTLA] just because he's closer to my age. I feel that I can crack jokes and make silly mistakes when [UTLA] helps me and I'm not afraid to not know an answer.

This student positioned the UTLA as someone that allows them to be mathematically vulnerable due to their closeness in age. Another student said it was “slightly easier” to talk to the UTLA because they were a “student,” whereas they viewed the GSI as a “professor.” Thus, some students preferred to interact with the UTLA because of the UTLA’s status as a peer, student, or because of their age. For others, gender played a role in how they perceived interactions with their GSI versus their UTLA. As an example, one student said:

I'm a college girl and so is [UTLA], it's just easier for us to interact I think. And I can more easily say when I don't understand something to her and stop her while she's explaining - I feel a little rude to do that to Professor [GSI].

Another student said they interact “better with women than men, and with students vs. teachers” and that she felt she had “more in common” with the UTLA than the GSI. Both students preferred to interact with their UTLA because they shared assumed commonalities in gender, but also academic status as a student. Some students acknowledged similarities between themselves and the UTLA but did not connect this to a preference for interacting with the UTLA versus the GSI. As an example, one student said “I think I treat [UTLA] more as a peer because we are closer in age” but did not say that they preferred one over the other.

Some students described intentionally interacting with GSIs and UTLAs for different purposes. One student explained that the “[GSI] is my professor so I come to her with more important or difficult questions. I also act more professional with her” whereas with their UTLA they are “much more relaxed” and ask “mundane questions.” Other students discussed approaching the UTLA for help on particular components of the course (e.g., homework) while approaching the GSI for different help (e.g., clarification on the notes).

Discussion

There were likely multiple storylines students drew from to make meaning of their interactions with the UTLAs and the GSI. However, these findings suggest that most students viewed, at one point or another, the UTLA as having the same position as the GSI in the classroom, and further judged the value of the UTLA according to their perceptions of what good teaching is, the dispositions of the UTLAs and GSIs, and how they felt in those interactions. Furthermore, although only a relatively small number of students did position UTLAs as providing a unique perspective or difference in instruction, for those students the impact of having someone they could relate to was impactful to their experience. Many of these students described similarities between the UTLA and themselves (i.e., categorical membership in the same communities) as supporting their desire to engage with the UTLA. Other students valued the different perspectives and expertise brought by the GSI and UTLA and used these differences to guide who they interacted with and for what purposes.

A major storyline in the literature about UTLAs is that the UTLA are near-peers, and thus more relatable. Yet, several students positioned UTLAs in ways that run counter to this storyline. Further research could investigate more deeply how the identities of UTLAs and instructors influence students’ storylines about UTLAs, particularly regarding the near-peer assumption. Research could also investigate the tacit and explicit ways that mathematics instructors and departments position UTLAs in active learning classrooms and connect that to the storylines evoked by students. Such research would expand our understanding of the roles UTLAs can play in supporting active learning mathematics classrooms.

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