

Setting Up Group Tasks: Rights and Duties of Instructors and Students

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In this contributed report, we share results from a study focused on the verbal communication acts of four undergraduate mathematics instructors while they are setting up group tasks. All four instructors teach at the same large eastern university and are experienced with active learning instructional practices. We found that two of the four instructors engaged in numerous verbal communication acts that assigned rights and duties to themselves as instructors and to their students. The other two instructors assigned only a few rights and duties to themselves or to students. We describe patterns in instructors' assignment of rights and duties, as well as how instructors' verbal communication acts shaped the classroom learning environment. Finally, we suggest how verbal communication acts focused on assigning rights and duties may relate to opportunities to learn and propose considerations for supporting students' participation in group work in active learning undergraduate mathematics classrooms.

Keywords: group work, opportunities to learn, positioning, participation, communication

Research on undergraduate mathematics classrooms has increasingly emphasized active learning and the use of group work to foster student engagement and deeper understanding. While numerous studies demonstrate that active and inquiry-based learning can improve learning outcomes (Laursen & Rasmussen, 2019; Freeman et al., 2014), the dynamics of how group work is set up by instructors remain underexplored. Work in this area is especially important since scholars note that group work does not automatically ensure a rich participation of all students in mathematical discussion; rather, instructor practices play a critical role in shaping the quality and distribution of learning opportunities (Cohen, 1994; Tanner, 2013).

To address this gap, we leverage positioning theory as an analytical tool, contextualized within Esmonde's (2009) theoretical framework for Opportunities to Learn (OtL). Esmonde's OtL framework identifies four interrelated dimensions of mathematics learning in groups: participation, social ecologies, communication, and identity development (detailed in the following section). In positioning theory, storylines, speech acts (or communication acts), and positioning (or rights and duties) form a triad in which the three constructs are mutually interdependent (Harré, 2012; Herbel-Eisenmann et al, 2016). This study is grounded in Esmonde's OtL framework and informed by positioning theory; we leverage two closely connected components of positioning theory to support our data analysis: communication acts, and rights and duties (Drageset & Ell, 2024). We identify instances of instructor communication acts, specifically verbal communication acts, in which they assign rights and duties either to themselves or to their students.

Recent scholarship has highlighted specific instructional practices related to each of the four dimensions of Esmonde's OtL framework that broaden access to OtL in group settings. Instructor facilitation practices such as assigning roles or explicitly inviting all members to contribute have been shown to promote more balanced participation (Webb et al., 2014). Related to social ecologies, patterns of social interaction combine with classroom layout, group size, and

the design of collaborative tasks to affect who has access to shared resources and whose ideas are visible (Horn, 2012). Regarding communication, researchers emphasize the importance of instructors explicitly framing discourse norms – for example, requiring explanation, justification, or collaborative sense-making rather than answer sharing (Yackel & Cobb, 1996; Yackel & Rasmussen, 2002). Finally, for identity development, instructor beliefs and positioning moves are critical: affirming students’ competence, validating diverse approaches, and distributing authority have been linked to stronger identity alignment with mathematics (Hand, 2012; Nasir, 2002).

While this body of work demonstrates the importance of instructional practices, little research has examined how instructors set up group tasks in undergraduate mathematics classrooms – the period when expectations, norms, and participation structures are first introduced. Task setup is a critical moment when access to OtL can be expanded or constrained, yet it remains underexplored. In this report we share findings from our study investigating the verbal communication acts instructors use when setting up group work. Specifically, we ask the following research questions: (a) What rights and duties do undergraduate mathematics instructors assign to themselves and/or their students during verbal communication acts while setting up group tasks? And (b) What patterns are identifiable across instructors in their assignment of rights and duties during group work setup?

In our discussion section, we consider how instructors’ verbal communication acts that assign rights and duties may shape students’ opportunities to learn, and we suggest how this study contributes to a deeper understanding of how active learning environments are enacted. We also highlight practical considerations for supporting effective group work in undergraduate mathematics classrooms to increase students’ participation in mathematical discussions.

Literature and Theoretical Framing

As mentioned above, Esmonde’s (2009) Opportunities to Learn (OtL) framework identifies four interrelated dimensions that structure access to mathematics learning in groups. Participation concerns who is invited to engage and how access to problem-solving is organized. Social ecologies emphasize the role of cultural norms and patterns of social interaction along with physical arrangements, group composition, and resource distribution in how the group organizes their relationships. Communication captures the expectations and norms for mathematical discourse, such as justification, explanation, and turn-taking. And identity development attends to how learners are positioned – as capable contributors or marginalized participants – through instructor and peer interactions. Together, these four dimensions provide a framework for examining what students are asked to do, how they are enabled or constrained in doing so and ultimately, the opportunities available to students to take up more central roles or positions as doers of mathematics.

For this study, we employ positioning theory, which includes the interrelated constructs of storylines, rights and duties, and communication acts. Rights and duties refer to the positions individuals and groups perceive themselves and others to hold in interaction (Drageset & Ell, 2024). In relation to Esmonde’s OtL framework, they are enacted and negotiated through communication, and they shape who speaks, who listens, and how contributions are taken up. These dynamics influence participation (the ways individuals are invited to or restricted from engaging), social ecologies (patterns of authority and interaction), and identity development (how competence is recognized or marginalized). Rights and duties are not fixed; they evolve as participants interact, challenge, or reinforce each other’s positions. Rights and duties are deeply intertwined with the communicative processes that structure opportunities to learn.

Communication acts (including verbal and gestures), aligned with the communication construct of the OtL framework, work to uphold or shift storylines (described next) and confirm or introduce new rights and duties. We use the construct of communication acts in this study with a specific focus on verbal communication acts that serve to name rights and duties of instructors and students. The third component of positioning theory, storylines, are “the ongoing repertoires that are already shared culturally or they can be invented as participants interact” (Herbel-Eisenmann et al., 2016, p. 188). In relation to Esmonde’s OtL framework, storylines contain aspects of participation (how people participate), social ecologies (patterns of social interaction) and identity development (who is seen as more or less competent). Participants may have different storylines, even within the same class or group, and storylines can evolve as participants see new ways to interact or engage with each other. Analyses focused on non-verbal communication acts and storylines, while potentially useful for future studies using this data, are beyond the scope of this report.

Methods

The data for this study was collected at a large, research-intensive, urban university in the eastern United States. We video recorded the first session of four classes in two different sequences of precalculus courses. Students in both courses are mainly freshman STEM students. The demographic makeup of these courses in terms of race/ethnicity and gender reflects the diversity of the campus (62% identified themselves as Female students, over 17% as Black/African American, 9% as Hispanic/Latinx, 13% as Asian, and 44% as White students, in a recent report). Between 10 to 15 instructors (mostly non-tenured) usually teach these courses, often in more than one section. The primary data for this study consists of four video-recorded episodes of four of these instructors introducing a group task in class. Each episode begins at the moment the instructor first references the task and ends when students transition into working together on the task. In addition to these video recordings, supporting data includes task artifacts (e.g., worksheets, slides, board captures) and contextual information (class size, course type, and institution). All instructors provided informed consent, and student images were blurred in all visual material.

We define the episode (the full instructor-led setup of the group activity) as our primary unit of analysis. Within each episode, we segment the interaction into verbal communication acts which are bounded events in which the instructor carried out a single type of action (e.g., framing the task, explaining roles, presenting norms for talk). Instructors’ verbal communication acts serve as our coding unit. Most instructional moves during the setup of group work involved the instructor prompting tasks, encouraging students to do work, reflecting on their own learning, and justifying class structure and organization. We categorized these verbal communication acts in one of four categories: instructor's rights, instructor's duties, students’ rights and students’ duties. We defined rights as the entitlements of participants and duties as the obligations or tasks that are assigned to participants. Two coders initially coded select verbal communication acts together to develop a coding scheme and then coded the remaining data independently. Finally, the two coders came together to gain consensus on the codes, and to select representative quotes for sharing in the results.

Results

Our coding revealed numerous instances of instructors engaging in verbal communication acts in which they assigned rights and duties while setting up group tasks. Table 1 provides the number of times we coded each participating instructor’s verbal communication acts as assigning

rights and duties. Note that all names used are pseudonyms. Table 2 provides examples of the types of verbal communication acts that were coded as teacher rights, teacher duties, student rights, and student duties. In the next section, we will present data analysis from quantitative and qualitative perspectives.

Table 1. Instances of instructor verbal communication acts in which they assign rights and duties.

Distribution of Assignment of Rights and Duties in Speech Acts

<u>Pseudonym</u>	<u>Teacher Duty</u>	<u>Teacher Right</u>	<u>Student Duty</u>	<u>Student Right</u>
Barb	6	6	7	6
Celia	6	3	2	4
Harry	2	2	3	2
Donna	2	1	0	3

Table 2. Examples of the type of instructor communication acts in which they assign rights and duties.

Examples of Communication Acts that Assign Rights and Duties

<u>Teacher Duties</u>	<u>Teacher Rights</u>	<u>Student Duties</u>	<u>Student Rights</u>
Facilitate student introductions	Assign students to groups	Be open to learning math in a new way	Have good mathematical learning experiences
Caring for the success and well-being of students	Select students to present work to the class	Communicate with group mates	Receive assistance with difficulties
Minimize lecture	Solicit knowledge from student groups	Join the group the instructor assigns them to	Be accepted into a community within the classroom

Analysis

The results presented in the previous section suggest that instructors' strategies for setting up group tasks vary widely. In this section, we present analyses from both quantitative and qualitative perspectives to more fully elaborate on these variations. First, we share two different perspectives for making sense of these results from a numerical perspective. We then provide descriptions of each of the four instructors' strategies for setting up group work to add context to the numerical findings.

Making Sense of the Data from a Numerical Perspective

These results reveal a variety of ways instructors set up group tasks, which can be understood through two different ways of viewing these numbers. First, instructors' use of verbal communication acts focused on assigning rights and duties differed in absolute quantity. While Barb and Celia assigned rights and duties relative to engaging in group work extensively,

Harry's and Donna's verbal communication acts while setting up group tasks included far fewer instances of assigning rights and duties.

Viewing these results from a different perspective reveals that instructors' verbal communication acts also varied in the relative number of instances of assigning rights and duties, as well as whether they assigned those rights or duties to themselves or their students. Barb and Harry assigned rights and duties to themselves as instructors, and to students, in ways that were roughly balanced across the two distinct roles (instructor vs student). In contrast, Celia and Donna assigned rights and duties in ways that were imbalanced. Celia and Donna both assigned more teacher duties and student rights, and fewer instances of instructor rights and student duties. We observed a balanced assignment of rights and duties in the verbal communication acts of one instructor who assigned numerous rights and duties (Barb), and a second instructor (Harry) who assigned relatively few rights and duties. Correspondingly, an imbalanced assignment of rights and duties occurred in the communication acts of one instructor, who assigned many rights and duties (Celia), and another instructor, who assigned relatively few rights and duties (Donna).

Making Sense of the Data From a Qualitative Perspective

Of the four teachers in this sample, Barb's verbal communication acts related to assigning rights and duties were the most numerous. Barb also provided the most explicit expectations for herself and her students in relation to group tasks. She positioned both herself and her students as a classroom community, providing explicit time for students to introduce themselves to others nearby and share contact information with each other, establishing chosen "math families" with whom they would work in class. She set specific duties for students with respect to these math families, saying that she "expect[s] that you guys are [talking] with the person next to you or some part of your math family multiple times in the class" and that students "don't always have to get it right...but you have to be doing as much as you can to learn from those around you." She sets herself as having the authority to monitor the status of group conversations, repeatedly commenting to specific students and the class that they should be communicating more (e.g., "this is awfully quiet for people who are working together" and "You have to talk with people. I'm sorry.") While she sets herself an authority to monitor and structure group conversations, she explains that this group format is motivated by students' right to have an engaging mathematical learning experience (e.g., "I don't want you guys to be working by yourself because it's so boring") and learn mathematics in an optimal manner, explaining that lecture is "not the best way to learn math, the best way to learn math is being interactive with it." Overall, Barb positions students as belonging to "math families," with certain rights and duties associated with belonging to such a group, and herself as a director and supporter of these groups.

Similar to Barb, Celia also engaged in numerous verbal communication acts focused on assigning rights and duties. And Celia also explicitly oriented her class around group work, explaining that she would occasionally provide "mini-lectures" to introduce concepts, but that the remainder of class time would be devoted to students "talking to each other, working on problems, and, of course, asking questions." During this work time, she stated her expectation that students should be "polite" to one another and that "if someone asks a question and you know the answer to it, it's good practice for you to explain it to somebody else." She also emphasizes her role in managing these group discussions, saying "I'll walk around and if I [think] someone's hanging back or not trying to engage, I'm going to try to encourage you to jump in and have that conversation." She encourages students to share their authentic thoughts about mathematics because "if I see a lot of people get it wrong, that's a nice clue to me that we

need to slow down and talk about something more.” Thus, Celia positions those in her classroom similarly to those of Barb’s but places a stronger emphasis on student questions.

Harry exhibited fewer instances of verbal communication acts focused on rights and duties but also structured his class around group work. Harry set less direct expectations for himself and students than Barb and Celia. Interestingly, he was the only instructor in our sample to assign students to groups, rather than letting students choose their own groups. He did this by handing each student a playing card as they walked in, then grouping based on kinds of cards (e.g., all four kings together, all four sixes together). While Barb and Celia repeatedly stated and reiterated specific expectations for the group work environment of their classrooms, Harry briefly explained to students that “you should first ask the other people in your group if they can help you out and if everybody’s stuck, then just let me know and then I’ll come by and help out.” While this dynamic of consulting group members and the instructor about mathematical questions is similar to what Barb and Celia describe for their classrooms, Harry does not present a specific social framework around ideas of comfort or community.

Donna had the fewest instances of verbal communication acts focused on rights and duties, and, unlike the other instructors, Donna did not explicitly mention group work as a component of the course. However, she did position herself similarly to other instructors, describing students’ right to ask questions and her duty to answer student questions. For example, she stated, “it’s because you asked a question that all of a sudden things made sense. That’s how this class works. All right, give me more questions.” Notably, she emphasized that students in her classroom should be able to ask questions without shame, telling students that they shouldn’t “be embarrassed about asking me questions” and that “you’re going to make mistakes. Congratulations. You’re human ... So, I don’t want you feeling bad if you made a mistake. I’m not going to think any worse of you.” Thus, while Donna did not directly mention group work, she did express the value of asking questions, much like the other instructors.

It is also worth noting some general observations from across all four instructors’ classrooms that may differ from active learning classrooms more generally. From a positioning standpoint (Herbel-Eisenmann et al., 2016), the students in these active learning classes mostly accepted the duties assigned to them. Barb sometimes pushed students to talk together to exchange emails/phone numbers, but otherwise, there were no instances of students resisting or speaking out against the active learning environment. And, while students have a right to learn, the instructors never suggested that students had a right to choose the learning environment. All of these courses are designed with active learning in mind, and students do not have another option. It is therefore an implied duty to adapt to the expectations of the classroom. Barb points out that high school classes might still have lecture models, and students will have to make the adjustment (a student duty) if that was their experience.

Discussion: Implications, Questions, and Future Work

In this study, we have examined several distinct ways in which mathematics instructors structure group work in pre-calculus courses. Notably, we found that, although all instructors involved in the study were experienced university mathematics teachers who self-identified as having strong commitments to implementing active learning practices, they varied in the extent to which they explicitly positioned themselves and students in group work settings. While some instructors (Barb and Celia) laid out specific ways in which students should interact with one another and the instructor, others (Harry and Donna) provided less direct guidelines for classroom interactions.

In active learning classrooms, communication and interaction are central and impactful aspects of students' learning experiences. Thus, it is crucial to have effective methods of revealing and understanding the vast differences in learning environments and experiences that result from different patterns of communication and interaction across active learning classrooms. Using communication acts, rights and duties provides one way of understanding important differences between classrooms that might otherwise seem quite similar.

As mentioned earlier, in the literature and theoretical framework section, rights and duties refer to the positions individuals and groups perceive themselves and others to hold in interaction (Drageset & Ell, 2024). They are enacted and negotiated through communication, and they shape who speaks, who listens, and how contributions are taken up. Rights and duties, as dynamic indicators of positionality, provide a way of understanding the OtL available to any individual student in classrooms that are all using active learning instructional practices, and that might seem similar in many ways. Leveraging positioning theory enables us to see differences in students' access to OtL, along with the degree to which students are more or less able to shift from marginalized or peripheral roles into more central roles of participation.

It is important to note that, while we have presented counts of rights and duties in this study separately for instructors and students, there may be a connection between instructor duties and student rights. If instructors have a duty to provide certain actions or resources to students, then correspondingly, students have a right to access those instructional actions or resources. There may also be a connection between instructor rights and student duties, as evidenced by some paired examples of the types of rights and duties instructors assigned. For example, if an instructor has a right to select students to present their work to the class, students may have a corresponding duty to present that work. Finally, there may be some rights and duties that exist independently. For example, a student duty that is not in direct relation to an instructor's right is the duty to help peers when they have questions. We aim to explore these connections in future work, especially in longitudinal data obtained from these courses.

Looking forward, we aim to further explicate the connection between these positioning acts and various aspects of the OtL framework. We are especially interested in questions such as: to what extent does the quantity or balance of verbal communication acts related to rights and duties correspond to OtL? How are these dimensions related and what are the implications? Additionally, we aim to incorporate student communication acts into our analysis and explore whether and how students take up, reject, or negotiate the positionings laid out by instructors in the initial class sessions, with particular attention toward how these roles influence students' access to mathematics content.

We conclude by highlighting the importance of instructors supporting effective group work in undergraduate mathematics classrooms by explicitly sharing or developing norms for participation, by naming rights and duties that position students as knowledgeable and capable doers of mathematics, and by opening the possibility for students to enact rights and duties in new and evolving ways that serve to increase their participation in mathematical discussions.

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