Explicit Group Norm Framing by MGTAs

Pablo Duran Oliva
Virginia Commonwealth University

Ben Haynes
VCU

Mary Beisiegel
Oregon State University

Considerable attention has been given to the role of Mathematics Graduate Teaching Assistants (MGTAs) in fostering classroom norms. This is especially pertinent in active learning settings where students extensively engage in group work with minimal direct instruction. Social stereotypes can be pervasive within small group dynamics, often hindering participation of students in mathematical discourse. Implementing explicit classroom norms is an effective strategy to promote a more inclusive distribution of learning opportunities. However, more research is needed on how these norms are enacted and supported. Our findings reveal significant differences between MGTAs who consistently frame group norms and those who do not, highlighting the benefits of explicit norm framing for promoting meaningful discussions, structuring group work, and ensuring inclusivity. These results underscore the importance of professional development focused on norm setting to enhance inclusive student engagement in mathematics classrooms.

Keywords: Classroom norms, Inclusion, Teaching Assistants

In recent years, considerable attention has been given to instructors' roles in establishing and fostering classroom norms that promote equitable and inclusive learning environments. The importance of these norms becomes even more pronounced in active learning settings, where traditional lectures give way to collaborative, student-centered activities. In these environments, students engage in problem-solving, discussion, and peer teaching, often working in small groups with minimal direct instruction from the teacher. The shift from passive listening to active participation is meant to enhance student learning processes, but it also brings significant challenges. Without appropriate support, group dynamics can easily mirror broader societal inequities, leading to uneven participation and marginalization of certain students based on gender, race, or other characteristics. Previous studies have demonstrated the pervasive nature of gender and racial stereotypes within small group dynamics, negatively impacting the equitable participation of minoritized groups in mathematical discourse. For instance, studies have shown that women and students from racial or ethnic minoritized groups often have their contributions overlooked, dismissed, or undervalued in group settings, which can lead to decreased confidence, lower participation rates, and reduced learning outcomes (Boaler, 2008; Esmonde, 2009). These patterns of exclusion not only limit the learning opportunities for those students but also reinforce harmful stereotypes about who is "good" at mathematics, reinforcing a cycle of inequity.

To address these issues, educators and researchers have increasingly advocated for the implementation of explicit classroom norms that could promote a more inclusive distribution of learning opportunities (Horn, 2012). Classroom norms can be understood as taken-as-shared beliefs and expectations guiding interactions within the classroom. These norms play a critical role in shaping how students engage with one another and with the content, influencing both the cognitive and social dimensions of learning (Yackel & Cobb, 1996). Rather than being explicitly stated, these norms often emerge through repeated interactions and are implicitly agreed upon by instructors and students. However, when classroom norms are explicitly articulated and consistently reinforced, students are more likely to engage actively and constructively with their

peers, leading to a richer and more inclusive learning experience for everyone involved (Esmonde, 2009).

Despite the growing recognition of the importance of explicit classroom norms, there is still a need for more research on how these norms are enacted by instructors. This is especially true for MGTAs who are often in the early stages of their teaching career. While some studies have explored the use of norms in K-12 settings (Boaler, 2008), less is known about how MGTAs—who may have limited teaching experience and training—understand, implement, and sustain norms in the college-level mathematics classroom. This study seeks to fill these gaps by investigating the use of explicit classroom group norms by 19 MGTAs in a university setting. MGTAs were observed in their classrooms on three separate occasions. Following these observations, three significant interactions between MGTAs and groups of students were analyzed in-depth to characterize the impact of these norms on student engagement. Two main research questions guided our study: 1) To what extent do MGTAs make use of explicit group norms in active learning classrooms? 2) How do MGTAs make use of explicit group norms in active learning classrooms? By examining how MGTAs articulate and reinforce classroom norms, and how these norms shape the dynamics of group work, this research aims to provide insights into effective teaching practices that foster inclusive and equitable learning environments in undergraduate mathematics education. Ultimately, the findings of this study could inform professional development programs for MGTAs and other instructors, contributing to the broader goal of making mathematics more accessible and welcoming to all students.

Methodology

The initial dataset included classroom videos from 19 MGTAs from three different institutions: Beta (5 TAs), Epsilon (5 TAs), and Gamma (9 TAs). During a year of professional development, MGTAs were asked to reflect on the impact of classroom norms on equity and inclusion but were not necessarily asked to give students detailed and explicit instructions on how they should work with peers in groups. Videos from all the MGTAs from a first PD cohort (2022-2023) were included. Due to time constraints, only two MGTAs from a second cohort (2023-2024) were included. TAs' classrooms were video recorded three times over an academic year. The first observation did not necessarily correspond to the initial class meeting. Although this limitation reduced our ability to capture a probable instance when instructors might establish classroom norms, it enabled us to identify moments where MGTAs felt the need to reinforce these initial norms throughout the semester. We hypothesized that MGTAs who explicitly reiterated group norms after the first class would place greater importance on being explicit about these norms than those who only addressed them on the first day.

To analyze such a large amount of data, we focused on three instances in each classroom observation: classroom setup, first interaction, and second interaction. Classroom setup occurred within the first 5-10 minutes of the lesson, during which the instructor set the tone for the class. Instructors outlined general expectations, goals for the session, and any specific guidelines for participation. We identified the end of this setup when MGTAs stopped addressing the whole class and most students were visible working in groups. The two subsequent interactions sampled after the classroom setup were often brief but were considered valuable as we expected that MGTAs might see them as an opportunity to reinforce the expectations given during classroom setup. These interactions were the first two instances 10-20 minutes after the classroom setup where MGTAs approached students to offer assistance. At that point we expected students would have had an opportunity to ponder the concepts or problems of the day.

We conducted three rounds of coding. In the first round, we established our data sample, identifying classroom setup, first and second interaction for each classroom video of each TA. In our second round of coding, we examined the extent to which MGTAs explicitly framed group norms during classroom setup, first or second interactions. Group norm framing was defined here for analysis purposes as instances when TAs not only communicated expectations about how students should work in groups, but also supported and nurtured group work in the classroom by facilitating the formation of groups, interacting with students via their groups, and attempting to answer questions by generating discussion within the group rather than prescriptively between themselves as a single student. In cases where MGTAs' answers were focused on answering individual content-related or logistic questions not intended to promote group work, we did not code the interaction as norm framing. A third round of thematic coding was conducted to characterize instructors' norm framing or instructors' alternative to norm framing when interacting with student groups. First, transcripts labeled as classroom setup or student interactions were coded and grouped into broader categories aligned with the study's research questions. Through iterative review, these categories were refined and collapsed into overarching themes, such as "clear expectations" and "individualized assistance."

Results

The total number of codes associated with explicit group norm framing by MGTAs who had at least four total codes is shown in Table 1.

Table 1. Number of codes by MGTA after second round of coding.

Id	Inst	Cohort	Setup	Interactions	T	Id	Institution	Cohort	Setup	Interactions	T
G1	Gamma	1	16	8	24	G3	Gamma	1	2	4	6
E1	Epsilon	1	11	3	14	G4	Gamma	1	2	2	4
E3	Epsilon	2	9	3	12	E1	Beta	1	0	4	4
G2	Gamma	1	9	1	10	B2	Beta	2	3	1	4
E2	Epsilon	1	6	3	9						

TAs with fewer than four codes total were excluded from the analysis as we considered their norm framing negligible for this study. The distribution of codes per participant in this table shows a low occurrence of explicit framing group norms in our sample with about 20% of MGTAs with higher than ten instances. The main themes identified in the third round of coding of the two MGTAs (G1, E1) with **high explicit framing group norms** were: clear expectations, structured groups, meaningful discussions, and inclusivity. First, at the beginning of the class, MGTAs set **clear expectations** of what group work was going to look like that day. These expectations were focused on communication within groups. For instance, G1 starts their class indicating that group discussions, sharing ideas, and helping each other are all valued during class. This is illustrated in the following quote of the first two minutes of class:

> *G1.* We'll get into groups. We'll take a little private think time and then we will discuss it in groups. So, remember that this is just… time to develop your mathematical thinking, and really share some rough draft thinking [...] It's totally fine if you have questions, if you

don't have an idea, that's OK, your group can help you out, you guys can help each other […] let's take just like, 2 minutes and then… we'll turn our desks and get into groups.

The **structured groups** theme characterizes the MGTAs' efforts to make sure all students were part of a group. MGTAs in this code impose this as a condition to work. The **meaningful discussions** theme is best illustrated in the following quote from G1 who addresses a group of three students (S1, S2, and S3).

S1: We're just not sure we're right.

G1: OK, what was your idea? [while the crouching down to students' eye level]

S1: So our idea was, we have 10 people… [hard to hear].

G1: OK, I like part of that. Let's talk about counting how many handshakes. Now, you're right that everyone [inaudible]. but consider this, put yourself in a room [...] with 20 other people, how many people's hands are you going to shake?

S1 and S2: 19 [while S3 remained silent]

G1: 19, right, 'cause you're not going to shake your own hand, so that's awesome, and you [pointing at S2] are going to share 19 hands, and [says S3's name] is going to shake 19 hands, so what would that lead us to? If every single person is going to shake 19 other people's hands... Discuss for a second, I'll come right back. I think you can get it.

G1 promotes meaningful discussions by building up on students' ideas ("What was your idea?"), validating their thinking ("I like part of that"), and scaffolding their thought with a simplified version of the problem. G1 also gives students time for non-supervised discussion, offering to come back later. The **inclusivity** code characterized instances when MGTAs address students' lack of engagement in a group work. For instance, in the previous interaction, G1 noticed that S3 remained silent and attempts to include them in the discussion while making them part of the example presented to the group. Furthermore, when G1 comes back 3 minutes after the previous interaction, notices that S3 is still not fully included so decides to purposefully stand next addressing them as follows.

G1: [G1 says student's name], how's it going?

S3: I'm good.

G1: Yep, you're good. [The TA stays with S3 and silently reviews the students' work].

G1: So, this is a great idea, I like this. [G1 then validates the S3's ideas and after noticing a mistake asks to explain their thinking, and attempts to guide them to notice it.]

The main themes identified in the third round of coding of two MGTAs (G4, B1) with **low explicit framing group norms** were: brief preamble, unstructured groups, prescriptive feedback, and individuality. The **brief preamble** theme characterized a class start with brief announcements and very little or no time information about the expectations for the day. MGTAs assume everyone will work on the worksheet. Sometimes MGTAs will ask students if they have questions, but in those cases waiting time was brief and students did not volunteer to ask any as shown in the following quote. The **unstructured groups** code represented a freer stance on group work. For instance, G4 in the previous episode made no mention of how groups were to be distributed and later did not force students to be part of a group. Furthermore, individual work is sometimes implicitly or explicitly accepted as shown in the following episode when B1 omit to ask SB1 to join a group.

B1: [Instructor approaches a lone student, asks where their partner is (?)]

SB1: "I was struggling with the integration by parts thing. I was trying to research how to properly do it again. I don't have any questions right now because I'm trying to just wrap my head around the concept."

B1: "Okay. If you've got questions, let me know. [Instructor walks off]

The prescriptive feedback code reflected instances where MGTAs gave detailed instructions or steps to follow, rather than allowing the students to independently explore solutions or discuss different strategies. An example of this can be found in the following episode where B1 approaches a group of four students seated at a table as SC2 asks a question.

SC2: Is that right? {SC2 asks B1 while seated with a group of three students in the same table]

B1: [B1 takes student's paper and quietly reads through problem to himself, and hands it back] Seems fine. I would cancel [something] though.

SC2: [Student clarifies] "I wasn't done with the problem"

B1: [B1 continues monitoring around the room]

B1 directly answered the question of whether SB1's answer was correct, missing an opportunity for instance for the student to explain their thinking. This episode is also an example of the **individuality code.** Although SC2 was in a group of four students, B1 only addressed one of them missing an opportunity to see if peers had a similar concern or make them part of the discussion.

Discussion

This study examined how Mathematics Graduate Teaching Assistants (MGTAs) use explicit group norm framing in small-group settings. Our findings highlight significant differences in the use of this framing. MGTAs who actively engaged in norm framing were able to create more structured and inclusive group dynamics, where students had clearer expectations about participation and communication. For instance, higher norm-framing instructors explicitly outlined the importance of group collaboration and fostered discussions by validating student contributions and addressing misconceptions through scaffolding.

The impact of these practices on student engagement was particularly evident in the inclusivity of students who might otherwise remain on the periphery. One key example from the study was how one MGTA (G1) actively included a previously silent student by personalizing feedback and engaging them in problem-solving, promoting a sense of belonging within the group. This aligns with prior research suggesting that explicit framing of sociomathematical norms can significantly improve student interaction and promote more equitable participation in group work (Esmonde, 2009; Yackel & Cobb, 1996).

Conversely, MGTAs who used lower explicit group norm framing provided minimal direction during group work. These instructors tended to allow students to work individually or without a structured approach to group dynamics. Their feedback often took the form of prescriptive answers rather than fostering collaborative discussions. Such practices, as observed in the study, missed opportunities to promote group cohesion and collective problem-solving. This finding supports previous literature that indicates the absence of structured group norms can perpetuate inequities in participation, particularly for minoritized students (Boaler, 2008; Horn, 2012).

Overall, the study underscores the importance of explicit group norm framing in fostering inclusive learning environments. By providing clear expectations and actively nurturing group work, MGTAs can significantly enhance student engagement and promote equity in classroom interactions. Future research could explore how professional development programs can further support MGTAs in implementing effective group norm-framing practices.

Acknowledgments

This work is supported by the National Science Foundation under Grant No. 2013590, 2013563, and 2013422. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

References

Boaler, J. (2008). Promoting equity in mathematics classrooms: The importance of explicit teaching of classroom norms. In L. D. English (Ed.), *Handbook of International Research in Mathematics Education* (pp. 462-469). Routledge.

Brousseau, G. (1997). *Theory of Didactical Situations in Mathematics*. Kluwer Academic Publishers.

Cobb, P., & Yackel, E. (1996). Sociomathematical norms, argumentation, and autonomy in mathematics. *Journal for Research in Mathematics Education*, *27*(4), 458-477.

Esmonde, I. (2009). Ideas and identities: Supporting equity in cooperative mathematics learning. *Review of Educational Research*, *79*(2), 1008-1043.

Horn, I. S. (2012). Strength in numbers: Collaborative learning in secondary mathematics. National Council of Teachers of Mathematics.

Johnson, D. W., & Johnson, R. T. (2009). An Educational Psychology Success Story: Social Interdependence Theory and Cooperative Learning. *Educational Researcher*, *38*(5), 365-379.

Kazemi, E., & Stipek, D. (2001). Promoting conceptual thinking through classroom norms. *Teaching Children Mathematics*, *7*(9), 6-10.

Reinholz, D. L., & Shah, N. (2018). Equity in groupwork: Using real-time data to address participation gaps. *ZDM Mathematics Education*, *50*(1-2), 341-353.

Sharan, Y., & Shachar, H. (1988). *Language and learning in the cooperative classroom*. Springer.

Yackel, E., & Cobb, P. (1996). Sociomathematical norms, argumentation, and autonomy in mathematics. *Journal for Research in Mathematics Education*, 27(4), 458-477.