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Student Verbal Impoliteness in Discussion-Based Mathematics Classrooms: A Qualitative Study on Interaction and Participation

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ABSTRACT
Background: Discussion-based mathematics instruction is intended to promote shared reasoning and active participation, yet its effectiveness depends on the quality of students' verbal interaction. When communication shifts toward interruption, dismissive remarks, or inappropriate tone, the collaborative nature of discussion may be weakened.
Aims: This study explores how verbal impoliteness is enacted by students during discussion-based mathematics learning and investigates its influence on classroom interaction and participation.
Methods: A descriptive qualitative approach was applied in an eighth-grade mathematics classroom implementing group discussions. Data were generated through direct classroom observations, semi-structured interviews with selected students and the teacher, and supporting documentation such as field notes. The data were examined through thematic analysis to identify recurring patterns of impolite verbal behavior and their effects on interaction.
Result: The study found that verbal impoliteness commonly appeared in the form of unsolicited interruptions, sarcastic or demeaning comments, and raised intonation when responding to peers. These behaviors disrupted the continuity of discussion, discouraged some students from contributing, and led to unequal participation within groups. As a result, interaction became dominated by a limited number of voices, while others withdrew from the exchange of ideas during mathematical problem solving.
Conclusion: Verbal impoliteness significantly shapes the quality of interaction and participation in discussion-based mathematics classrooms. Establishing shared norms of respectful dialogue and consistently guiding students toward constructive communication are essential for sustaining inclusive and meaningful mathematical discussion.

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Introduction

In recent years, growing attention has been directed toward improving not only students' mathematical achievement but also the quality of classroom interaction that supports meaningful learning. As educational practices increasingly emphasize collaborative inquiry, discussion-based mathematics instruction has been widely adopted to promote reasoning, critical thinking, and shared problem solving. Within this approach, dialogue serves as the primary medium through which students articulate ideas, challenge assumptions, and construct understanding together (France, 2021; Rapanta, Vrikki, et al., 2021). Consequently, the effectiveness of discussion-based learning depends heavily on the nature of students' verbal interaction (Aljohani & Hanna, 2023; Chen & Tsao, 2021).

Although structured discussion is intended to create an inclusive environment, classroom exchanges do not always unfold in supportive ways. Instances of interrupting peers, dismissing alternative solutions, or responding with inappropriate tone may emerge during group work (Mamas et al., 2023; Siegel-Stechler, 2023). Such behaviors, while sometimes subtle, can reshape participation patterns within the classroom. Students who perceive their contributions as undervalued may become reluctant to speak, which gradually alters the balance of interaction (Protassova & Yelenevskaya, 2024; Rapanta, Botturi, et al., 2021).

When verbal impoliteness persists, the collaborative intention of discussion-based mathematics learning may be compromised. The classroom may shift from a space of shared exploration to one marked

by uneven participation and limited dialogue (Stewart & Jansky, 2022). Understanding how these communicative practices influence interaction and participation is therefore essential in evaluating the sustainability of discussion-oriented mathematics instruction (Elhilal, 2025; Wilkerson et al., 2025).

Beyond its immediate effect on discussion flow, verbal interaction plays a crucial role in shaping students' sense of belonging within the classroom community (Zengilowski et al., 2023). Participation in mathematics discussions often requires students to expose tentative reasoning and incomplete ideas, which makes them vulnerable to peer evaluation (Nama & Ayalon, 2024; Zhou et al., 2025). In environments where responses are dismissive or interruptive, students may interpret such reactions as personal rejection rather than academic disagreement. Over time, this perception can reduce their willingness to take intellectual risks during collaborative tasks.

Mathematics classrooms present a particularly distinctive communicative context because arguments are frequently framed in terms of correctness and logical precision (Drageset & Ell, 2024; Kontorovich, 2021). While critical evaluation is central to mathematical reasoning, the manner in which feedback is delivered can determine whether discussion remains constructive or becomes confrontational (Smit et al., 2024). The boundary between rigorous critique and verbal impoliteness can therefore be difficult to navigate, especially among adolescents who are still developing social and communicative awareness.

Furthermore, classroom discourse is not merely an exchange of information but a social process that distributes power and authority among participants (Kim, 2024; Nadeem, 2024). Students who speak more assertively may gain greater control over the direction of discussion, while quieter peers may gradually recede from interaction (Erdemir & Brutt-Griffler, 2022; Sagoo et al., 2025). In such situations, participation becomes uneven, and the dialogic character of collaborative learning weakens. This imbalance may remain unnoticed if attention is focused solely on task completion rather than interactional dynamics.

The issue of verbal impoliteness also intersects with students' emotional experiences during learning (McNab & Mavrou, 2025; Triyono et al., 2025). Feelings of embarrassment, frustration, or anxiety triggered by negative responses can shape how students position themselves in future discussions (Park & Ramirez, 2022). When emotional safety is compromised, even well-designed collaborative tasks may fail to generate inclusive engagement. Therefore, examining verbal impoliteness is not simply a matter of classroom etiquette but a question of sustaining equitable participation in learning.

Despite increasing attention to classroom discourse in mathematics education, specific inquiry into student verbal impoliteness within discussion-based settings remains limited (Cho, 2023). Much of the existing research emphasizes strategies for improving discourse quality without closely examining how negative communicative behaviors disrupt interaction and participation (Asimakopoulos et al., 2025; Binlibdah, 2024). Addressing this gap is essential for developing a more comprehensive understanding of how everyday verbal practices shape the success of collaborative mathematics instruction.

Research in mathematics education has extensively explored instructional strategies and cognitive outcomes, yet comparatively less attention has been paid to the communicative conditions that shape student engagement. Discussion-based learning assumes that students feel psychologically secure enough to propose ideas, including tentative or incomplete reasoning. However, verbal impoliteness may undermine this sense of security and subtly restrict students' willingness to contribute. (Cayubit, 2022) Participation in classroom discussion is often attributed to motivation or academic ability, while the influence of interpersonal communication receives limited examination. Viewing participation as socially constructed rather than purely individual highlights the need to examine how communicative behaviors affect interactional balance. This study is therefore motivated by the need to understand how everyday verbal practices shape engagement within mathematics discussions (Planas et al., 2023; Schwarts et al., 2023).

Classroom interaction is widely recognized as central to learning, particularly within sociocultural perspectives that position dialogue as a tool for knowledge construction. In mathematics education, collaborative discussion has been associated with deeper conceptual understanding and improved reasoning processes. Productive discourse typically relies on shared norms, respectful turn-taking, and openness to multiple perspectives. Studies on mathematical communication emphasize students' ability to explain strategies, justify solutions, and respond constructively to peers. Meanwhile, research in communication and pragmatics identifies verbal impoliteness such as interruptions, sarcastic remarks, or demeaning responses as behaviors that can threaten interpersonal relationships and disrupt cooperation. In educational settings, such behaviors may influence students' confidence and participation patterns. Andersson and McIntyre (2025) Despite these insights, much of the existing research either focuses on enhancing communication skills or analyzes impoliteness primarily from a linguistic perspective. The specific intersection between verbal impoliteness and discussion-based mathematics learning remains relatively underexplored.

Although prior studies have examined classroom discourse and mathematical communication, limited research explicitly addresses verbal impoliteness as a factor shaping interaction and participation in mathematics classrooms. Most investigations aim to improve discourse quality without considering how negative communicative behaviors influence engagement dynamics.(Larsen & Madsen, 2025) Furthermore, research on impoliteness is often situated within language studies rather than subject-specific instructional contexts. Mathematics classrooms present distinctive interactional characteristics, including logical argumentation and collaborative problem solving, which may shape how impoliteness manifests and affects participation. The absence of qualitative inquiry grounded in authentic mathematics discussions indicates a clear gap in the literature. (Pan, 2025) Addressing this gap requires an in-depth exploration of how verbal impoliteness emerges in real classroom settings and how it influences patterns of interaction and student participation.

This study aims to identify forms of student verbal impoliteness in discussion-based mathematics classrooms and to examine how these behaviors influence interaction and participation. By focusing on classroom practices and students' lived experiences, the study seeks to contribute a contextual understanding of how communication shapes collaborative learning in mathematics education.

Method

Research Design

This study adopted a descriptive qualitative design to investigate student verbal impoliteness in discussion-based mathematics learning and to understand how it shaped classroom interaction and participation. A qualitative approach was considered appropriate because the phenomenon under study is embedded in everyday classroom talk and cannot be meaningfully captured through numerical summaries alone. The inquiry focused on naturally occurring exchanges during group discussions, with attention to how students responded to one another and how those responses influenced who spoke, who remained silent, and how the discussion unfolded over time.

To clarify the sequence of procedures carried out in this research, the overall process is summarized in Figure 1.

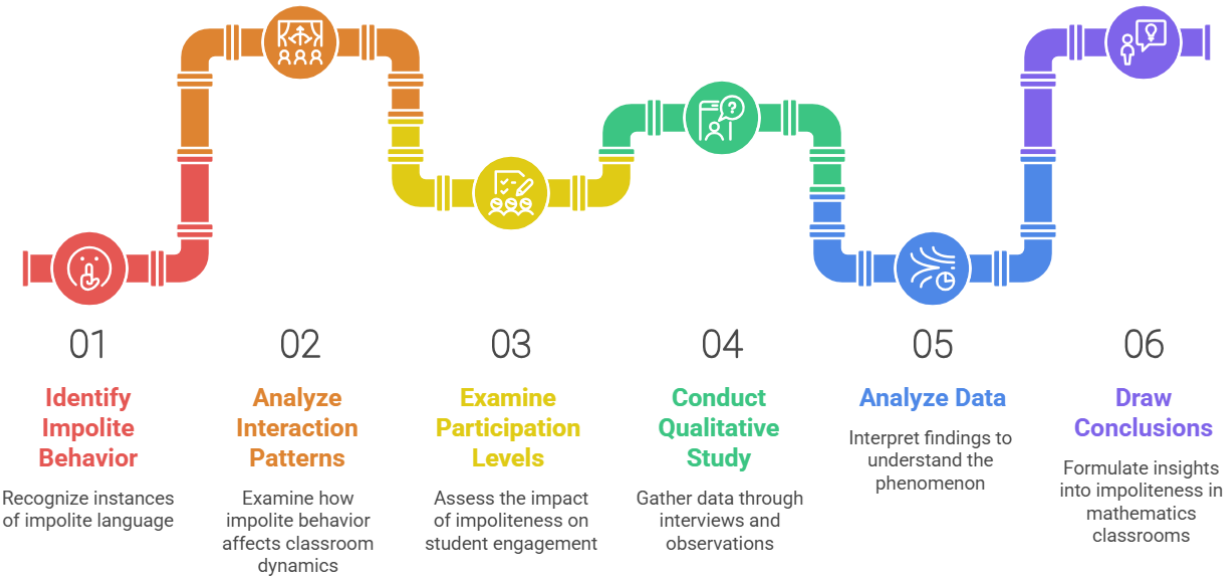

Figure 1. Research Procedure of the Study

Figure 1 outlines the main stages of the study, beginning with identifying impolite verbal behaviors that appeared during mathematics discussions. The next stages involved examining interaction patterns and participation levels as they occurred in group work. These steps were supported by qualitative data collection and subsequent analysis, which informed the final interpretation and conclusions.

Participant

The study involved eighth-grade students from a junior secondary mathematics classroom where discussion and small-group work were routinely used as part of instruction. The classroom was selected purposively because it provided sustained opportunities to observe student-to-student interaction in problem-solving discussions. Within the class, several students were approached as focal participants to reflect variation in participation and communicative behavior observed during discussion sessions. The mathematics teacher was also included as an informant to provide contextual explanations regarding classroom norms, expectations for discussion, and common interactional issues that emerged during lessons.

Instrument

Three sources of data were used: classroom observation, semi-structured interviews, and documentation. Observation served as the primary means of capturing real-time interaction during discussion-based lessons, including interruptions, dismissive responses, and tone-related cues that affected turn-taking and participation. An observation guide was used to maintain consistency in recording key interactional events, while field notes were written to preserve contextual details of each session. Semi-structured interviews were conducted with selected students to explore how they interpreted impolite remarks and how such experiences influenced their willingness to participate. Interviews with the teacher focused on classroom interaction routines, disciplinary responses to impolite speech, and perceptions of student engagement during discussions. Documentation, such as lesson notes and relevant records produced during observation, was used to strengthen the description of the setting and to support triangulation across data sources.

Data Analysis

Data analysis was conducted through thematic analysis. Observation notes and interview responses were first organized and read repeatedly to gain familiarity with the data. Initial coding was then carried out to label recurring forms of verbal impoliteness and immediate responses from peers, including changes in participation, shifts in turn-taking, and disruption of discussion flow. The codes were subsequently grouped into broader themes that represented (1) types of impolite verbal behavior and

(2) their implications for interaction patterns and participation in mathematics discussions. To strengthen trustworthiness, patterns identified from classroom observation were compared with interview accounts from students and the teacher. Consistency across sources was used to refine themes, while any differences were treated as meaningful variation that required further interpretation. The final stage involved connecting the themes to the study focus on interaction and participation in discussion-based mathematics learning.

Results and Discussion

Results

The findings of this study indicate that verbal impoliteness was not an incidental occurrence in discussion-based mathematics learning, but a recurring interactional pattern that influenced how students engaged with one another. The analysis shows that certain verbal behaviors reshaped both the flow of discussion and the distribution of participation within groups. Rather than merely affecting isolated exchanges, these behaviors gradually shaped the overall climate of classroom dialogue.

Forms of Student Verbal Impoliteness

Observation data revealed several consistent forms of verbal impoliteness during group discussions. Students occasionally interrupted peers before explanations were completed, particularly when they believed their own answers were more accurate. In other instances, responses to incorrect solutions were delivered in a dismissive manner, sometimes accompanied by brief remarks that implied inadequacy rather than clarification. Tone also played a role; raised or sarcastic intonation intensified the impact of otherwise short comments. These behaviors, although sometimes subtle, influenced how discussions unfolded. When interruptions occurred repeatedly, the continuity of reasoning was disrupted. Students whose ideas were cut off often did not return to complete their explanations. Likewise, dismissive remarks reduced the likelihood of alternative strategies being explored further. The identified forms of verbal impoliteness are summarized in Table 1.

Table 1. Forms of Student Verbal Impoliteness in Discussion-Based Mathematics Classrooms

Category	Classroom Description	Interactional Feature Observed
Unsolicited interruption	Students cut off peers before explanation completion	Turn-taking becomes unstable
Dismissive remarks	Negative reactions to incorrect or alternative answers	Shift toward defensive dialogue
Inappropriate tone	Raised or sarcastic voice in response to peers	Increased tension in group discussion
Immediate evaluative responses	Quick judgment without constructive elaboration	Reduced opportunity for idea development

Consequences for Interaction and Participation

The presence of these verbal behaviors was closely linked to changes in interactional balance. In groups where interruptions were frequent, discussion became less dialogic and more competitive. Rather than building on one another's reasoning, students tended to assert individual solutions. Turn-taking patterns became uneven, with certain students assuming dominant roles while others gradually reduced their contributions. Interviews further suggested that some students preferred to remain silent after experiencing dismissive responses. They expressed reluctance to risk embarrassment or further interruption. This withdrawal was not immediate in every case, but it became more visible across successive discussion sessions. Over time, participation concentrated among a small number of assertive individuals, while quieter students spoke less frequently.

The broader implications of these patterns are summarized in Table 2.

Table 2. Impact of Verbal Impoliteness on Interaction and Participation

Observed Effect	Impact on Interaction	Impact on Participation
Disrupted discussion flow	Fragmented development of mathematical reasoning	Hesitation to share ideas
Dominance of assertive students	Uneven turn-taking and reduced dialogue reciprocity	Withdrawal of less confident students
Reduced psychological safety	Tense atmosphere during group work	Decrease in voluntary engagement
Weakening of mutual respect	Limited constructive peer feedback	Lower overall participation levels

Taken together, these findings demonstrate that verbal impoliteness influenced not only immediate exchanges but also longer-term participation patterns. Although discussion-based mathematics instruction is intended to promote collaborative reasoning, the interactional climate significantly shaped who felt comfortable contributing. The results suggest that maintaining respectful communication is central to sustaining inclusive and meaningful participation in mathematics classrooms.

Discussion

This study set out to examine how student verbal impoliteness shapes interaction and participation in discussion-based mathematics classrooms. The findings suggest that impolite verbal behaviors were not isolated incidents but recurring interactional patterns that gradually influenced the structure of classroom dialogue (Beschieru, 2021; Cheung, 2021). While discussion-based learning is designed to promote shared reasoning and collaborative exploration Chang et al. (2025), its effectiveness appeared closely tied to the quality of students' communicative practices (AlAfnan et al., 2024).

The results indicate that interruptions, dismissive remarks, and inappropriate tone disrupted the continuity of mathematical explanation (Valencia Mazzanti & Karsli-Calamak, 2022). In principle, mathematics discussion provides space for students to articulate incomplete reasoning and refine their ideas through peer exchange (Çelik & Arslan, 2025). However, when explanations were cut short or responded to in a dismissive manner, opportunities for elaboration diminished. Instead of encouraging idea development, interaction shifted toward quick evaluation and assertion. This shift altered the nature of the discussion, reducing its dialogic quality and limiting collective reasoning (Walsh & Matsumura, 2025).

Beyond immediate disruption, verbal impoliteness also affected participation patterns over time(Wodak et al., 2021). Students who experienced negative responses to their contributions became more cautious in subsequent discussions. Interviews revealed that some preferred to remain silent rather than risk being interrupted or judged. This gradual withdrawal led to uneven participation, where a small number of confident students dominated interaction (Severe et al., 2024). Consequently, participation was shaped not only by academic readiness but also by how safe students felt within the communicative environment (Salbaş & Ekmekçi, 2025).

These patterns highlight the relational dimension of mathematics learning. Although mathematics is often framed as a cognitive discipline, the findings underscore that its classroom enactment is inherently social (Kitsantas et al., 2021). The success of discussion-based instruction depends on more than task design; it requires interactional norms that support respectful exchange (Paul et al., 2023). When such norms are weak or inconsistently practiced, the collaborative intention of discussion can be compromised.

Taken together, the study suggests that verbal impoliteness influences both how students interact and who ultimately participates. The findings point to the importance of explicitly addressing communication practices within mathematics classrooms (Erath et al., 2021). Establishing shared expectations for respectful dialogue and guiding students to provide constructive responses may help sustain inclusive participation (Lapidot-Lefler, 2025). In this sense, fostering polite communication is not

an additional component of instruction but a foundational condition for meaningful mathematical discussion.

Implications

The findings of this study suggest that the effectiveness of discussion-based mathematics learning depends not only on the quality of instructional tasks but also on how students communicate with one another during collaborative work. Verbal behaviors such as interrupting, belittling responses, or using inappropriate tone were shown to influence both interaction flow and students' willingness to participate. This indicates that respectful communication should be treated as an integral component of instructional design rather than a peripheral classroom rule. Teachers may consider establishing clear expectations for turn-taking and constructive feedback, while consistently modeling how to challenge ideas without undermining peers. Incorporating brief reflective moments after group discussions may also help students become more aware of how their words and tone shape the classroom climate, ultimately supporting more inclusive and balanced participation in mathematical dialogue.

Limitations

Several limitations should be acknowledged when interpreting the results of this study. First, the research was conducted within a single classroom context, which means the findings are situated and may not automatically reflect patterns in other schools, grade levels, or cultural settings. Second, the study relied on qualitative data from observation and interviews, focusing on interactional patterns and participant perspectives rather than quantitative indicators such as frequency counts of interruptions or long-term academic performance. Third, the identification of verbal impoliteness was grounded in contextual interpretation and participant experience, which may vary across individuals despite efforts to ensure credibility through triangulation. These considerations suggest that the findings provide contextual insight rather than universal generalization.

Suggestions

Future research could extend this inquiry by examining multiple classrooms or educational contexts to determine whether similar patterns of verbal impoliteness and participation shifts emerge across diverse settings. A mixed-method approach may also be valuable, combining qualitative analysis with systematic documentation of participation patterns to better understand how communicative behavior relates to engagement. Additionally, classroom-based intervention studies could explore practical strategies such as structured discussion protocols, peer-feedback training, or guided reflection activities to assess their effectiveness in promoting respectful dialogue and sustaining equitable participation in discussion-based mathematics learning.

Conclusion

This study investigated the role of student verbal impoliteness in shaping interaction and participation during discussion-based mathematics learning. The findings show that interruptions, dismissive responses, and an inappropriate tone appeared as recurring features of classroom talk and had tangible consequences for how mathematical discussion progressed. When students were cut off or their ideas were met with belittling remarks, explanations tended to remain incomplete, the exchange of reasoning became fragmented, and turn-taking grew increasingly uneven. Over time, these interactional conditions affected participation, as some students reported becoming more hesitant to speak and chose silence to avoid further negative reactions, while a small number of more assertive peers came to dominate the conversation. Taken together, the results suggest that the inclusiveness and collaborative intent of discussion-based instruction depends not only on the quality of tasks but also on the communicative climate in which those tasks are enacted, making respectful classroom dialogue a foundational requirement for sustained and balanced participation.

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Author Contributions Statement

Maria Carmelita Tali Wangge conceptualized the study, developed the research design, conducted classroom observations, and led the manuscript writing process. Maria Fatima Wio contributed to data collection through interviews and documentation, assisted in data organization and initial coding, and participated in drafting several sections of the manuscript. Angela Merici Bhebhe supported data analysis, contributed to the interpretation of findings, reviewed relevant literature, and critically revised the manuscript for intellectual content. All authors discussed the results, approved the final version of the manuscript, and agreed to be accountable for all aspects of the work.

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