Academic Education Publishing House

Philosophy and Social Science Vol. 2 No. 8, 2025

Current Situation and Cultivation Strategies of Student-Student Dialogue in Lower Primary Mathematics Classrooms

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Abstract: Our research reveals that student-student dialogue has become one of the mainstream forms of classroom dialogue in contemporary education. While teachers have a relatively high level of awareness regarding student-student dialogue, their ability to organize such dialogue in classrooms remains insufficient—they encounter numerous difficulties and uncertainties in the process. Most students are willing to participate in dialogues and even aspire to be speakers or take the lead in addressing issues. Additionally, our findings indicate that during student-student dialogue, students demonstrate strong performance in listening, problem analysis, critical thinking, and verbal expression, showing distinct advantages in these aspects. In terms of information flow among students, two-way flow is dominant, but one-way flow also accounts for a significant proportion. This suggests that student-student dialogue in current classrooms is far from ideal: it lacks sufficient breadth and depth, and students' participation, interaction, and the intellectual depth of their dialogue are inadequate.

Keywords: Student-Student Dialogue; Mathematics Classrooms; Lower Primary Grades; Current Situation of Dialogue; Dialogue Strategies

1. Analysis of the Current Situation of Student-Student Dialogue in Mathematics Classrooms

1.1 Analysis of Attention to Student-Student Dialogue and Classroom Organization

The research team distributed the two semi-open questionnaires to frontline teachers and first/second-grade students. The results showed that student-student dialogue has become one of the mainstream forms of classroom dialogue. Frontline teachers generally recognize the value of student-student dialogue: survey data indicated that 40% of frontline teachers consider it "very important," while 60% regard it as "important." This confirms that most teachers acknowledge the significance of student-student dialogue in classroom learning. With the deepening of the new curriculum reform, the concept of student-student dialogue has taken root in teachers' minds [1].

As shown in the statistical charts (Figure 1 and Figure 2), most teachers pay attention to the topic of student-student dialogue, but a considerable number of them only have a superficial understanding of it—indicating that they have not fully grasped its importance and necessity. In terms of practical application in classrooms, however, many teachers only use student-student dialogue occasionally, reflecting insufficient emphasis or failure to fully leverage its advantages. In short, while all teachers agree on the importance of student-student dialogue, few actually organize it in their classes. This discrepancy deserves in-depth reflection.

For Example:

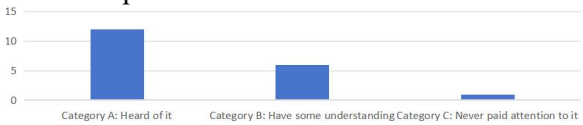

Figure 1. Have You Ever Heard of the Term "Student - Student Dialogue"?

For Example:

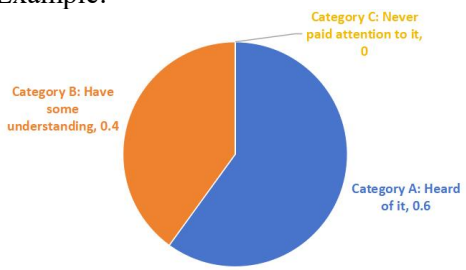

Figure 2. Do you Often Organize "Student - Student Dialogue" in Your Own Classes?

Statistical data also revealed that novice teachers often struggle to fully recognize the value of student-student dialogue, control the dialogue process, or manage classroom dynamics during

such activities. As a result, they tend to avoid using this dialogue form as much as possible. In contrast, with increasing teaching experience, teachers place greater emphasis on student-student dialogue: they organize more frequent dialogue and discussion activities, allowing students more time to interact. Through dialogue, students co-construct knowledge and shared understanding, and teachers who witness these positive outcomes become more inclined to prioritize student-student dialogue in their teaching.

1.2 Comparative Analysis of Multiple Teaching Dialogue Forms

Dialogue teaching is the core and soul of classroom instruction. Its basic forms include: teacher-text dialogue, student-text dialogue, teacher-student dialogue, student-student dialogue, teacher self-dialogue, and student self-dialogue.

A survey of frontline teachers (Figure 3) showed that classroom dialogue primarily consists of teacher-student dialogue, student-student dialogue, and student-text dialogue, supplemented by teacher-text dialogue, student self-dialogue, and teacher self-dialogue. This structure reflects the richness and diversity of classroom dialogue [2].

For Example:

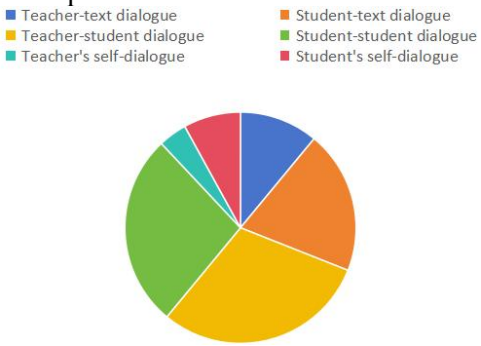

Figure 3. Do You Think the Dialogue Forms in Class Are Important in Terms of teaching Effects?

Upon further reflection, we can see that with the comprehensive advancement of the new curriculum reform, classroom dialogue forms have become more diverse. In particular, the proportion of student-student dialogue in classrooms and its status in teachers' minds have significantly increased, and a student-centered dialogue model is gradually taking shape. However, the statistical chart also indicates that teacher self-dialogue and student self-dialogue account for a relatively small share of classroom interactions. This prompts us to reflect: how can we promote self-dialogue among both teachers and students to deepen and enhance teaching and learning?

1.3 Teachers' Difficulties in Organizing Student-Student Dialogue

In daily classroom teaching, teachers often face confusion, doubts, or challenges when organizing student-student dialogue. The main issues identified are as follows [3]:

- Low student confidence: Manifested in passivity, shyness, and soft speaking voices.
- Weak verbal expression skills: Students' thinking may outpace their language development, or they may fail to address the question directly.
- Insufficient comprehension ability: Students struggle to accurately and effectively understand and analyze peers' viewpoints, leading to limited depth and breadth of dialogue.
- Oversimplified or unfocused questions: Discussions may deviate from the topic, with students talking about different issues or failing to align on a common discussion focus—resulting in off-topic dialogue.
- Poor listening habits: Students are self-centered and lack respect for peers' contributions, failing to listen attentively.
- Low student participation: Dialogue lacks standardization and orderliness, requiring improvement in these areas.
- Inadequate teacher regulation strategies: Shortcomings in selecting and presenting content, arranging time, adapting to student needs, guiding expression, clarifying requirements, and balancing teacher intervention (when to step in or step back).
- Needs for better evaluation: Timeliness, effectiveness, and sustainability of evaluation need to be strengthened.

These issues directly or indirectly hinder the implementation of student-student dialogue and serve as bottlenecks in classroom practice. To organize effective student-student dialogue, frontline teachers must reflect deeply on these challenges and adopt targeted strategies.

1.4 Students' Willingness to Communicate with Peers and Express Themselves

As shown in Figure 4, nearly all students enjoy sharing their ideas with peers and exhibit a strong willingness to do so. However, significant differences exist: high-achieving students show

greater enthusiasm for expression. This reflects their stronger desire for learning, communication, and knowledge sharing, demonstrating their proactive attitude toward learning.

For Example:

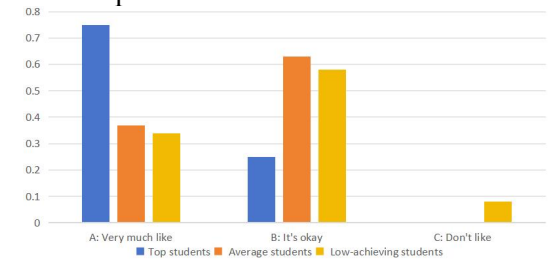

Figure 4. Do You Like to Share Your Ideas with Classmates in Math Class?

In the survey comparing students' willingness to express themselves and their actual speaking frequency (Figure 5 and Figure 6), all three groups of students (high-achieving, average-achieving, and low-achieving) showed a strong willingness to speak—with no obvious differences in this regard. However, a sharp contrast emerged in their actual speaking frequency: high-achieving students spoke significantly more often, while low-achieving students rarely spoke. Despite low-achieving students' strong willingness to participate, their limited speaking opportunities warrant in-depth reflection by frontline teachers.

For Example:

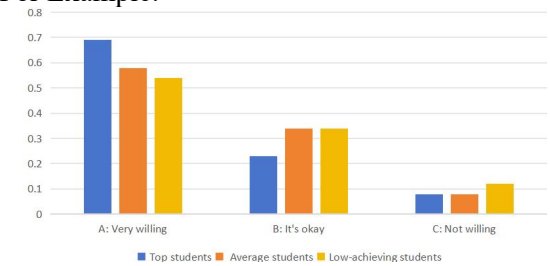

Figure 5. Are You Willing to Express Your Thoughts when Communicating with Classmates?

For Example:

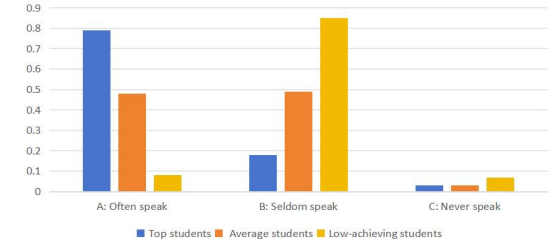

Figure 6. How Many Times do You Speak when Communicating with Classmates?

1.5 Students' Listening and Speaking Behaviors

In the comparison of listening and speaking behaviors (Figure 7 and Figure 8), high-achieving and average-achieving students were more willing to speak. This reflects young students' strong desire to be noticed: they hope peers will listen to their ideas and agree with their viewpoints, aspiring to be the "focus" of the group and take the lead in addressing problems. In contrast, low-achieving students were more willing to listen—a tendency closely linked to their status as a disadvantaged group in the class. This highlights the need for teachers' guidance and encouragement to support their active participation.

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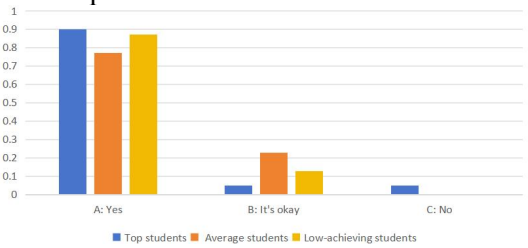

Figure 7. Do You Listen Carefully to Others' Ideas when Communicating with Classmates?

For Example:

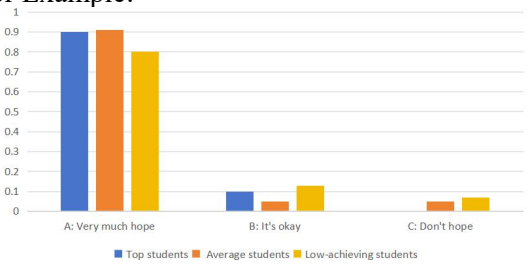

Figure 8. When Talking and Communicating with Classmates, Do You Hope that Classmates will Listen Carefully to Your Ideas?

1.6 Students' Questioning and Critical Thinking

As shown in Figure 9 and Figure 10, across all three student groups, there was a lack of questioning, help-seeking, and critical thinking. This indicates that a large number of students are hesitant or inactive in researching problems, exploring questions, and seeking help—factors that act as bottlenecks for their development.

For Example:

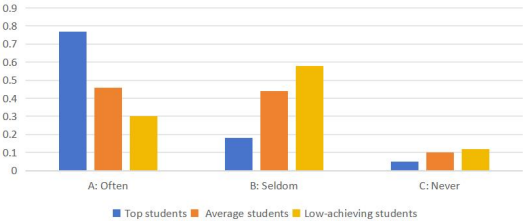

Figure 9. When Communicating with

Classmates, if You Don't Understand or Can't Follow, Do You Take the Initiative to Ask Questions and Seek Help from Classmates?

For Example:

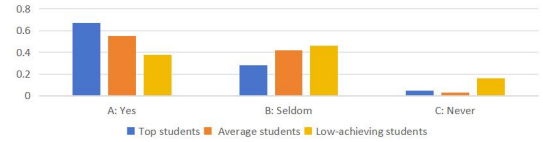

Figure 10. When Talking and Communicating with Classmates, Do You Raise Questions that Are Different from Others?

A comparison of the three groups reveals that high-achieving students have a clear advantage in seeking help and raising questions: they are more proactive in these behaviors. Their strengths in exploring problems, discussing ideas, and challenging viewpoints further promote their mathematical thinking and literacy.

1.7 Dialogue Communication and Learning Gains

Analysis of questionnaire data from different student groups uncovered interesting patterns: regardless of academic performance, all students prefer to communicate with peers who are polite, attentive listeners, and open to others' opinions. This indicates that students strongly desire their ideas to be heard, valued, and recognized by others. Additionally, they prefer interacting with high-achieving peers who are thoughtful, eager to learn, and active in speaking. This phenomenon suggests that all students aspire to excel academically—subconsciously wanting to perform better, they tend to associate with high-achieving classmates [4].

A comparative analysis of the three groups revealed a notable finding: average-achieving and low-achieving students have higher expectations for their dialogue partners. They prefer peers with outgoing, cheerful, and sensible personalities, as well as those who listen attentively in class and have a positive learning attitude. Furthermore, low-achieving students have even higher expectations: they hope their dialogue partners are helpful, diligent, popular among classmates, and willing to agree with their viewpoints.

This survey also shows that lower primary students tend to be self-centered and have a strong desire to be noticed. They hope others will listen to their ideas, agree with their views, and gain peer support.

When asked about their gains from peer communication, all three student groups reported acquiring knowledge and learning problem-solving methods. Low-achieving students only mentioned these two points, and some even claimed to have gained nothing. This may be because low-achieving students fail to recognize their own learning gains or because their dialogue lacks depth, resulting in ineffective discussions. In contrast, high-achieving students reported more diverse gains: they noted acquiring different perspectives, strengthening friendships, learning to listen and speak effectively, and broadening their thinking. While average-achieving students reported fewer gains than high-achieving ones, they had clear goals and understood what they wanted to achieve through dialogue.

In summary, low-achieving students experience fewer gains from dialogue but have higher expectations for peers. Members of our research team agree that low-achieving students hope to interact with high-performing peers to gain knowledge or friendship. High-achieving students, however, benefit more from dialogue than the other two groups—they also have a unique expectation: they hope their peers will provide opinions and suggestions during communication.

1.8 Video Observation of Student-Student Dialogue in Lower Primary Mathematics Classrooms

The researchers randomly selected mathematics classes covering different topics from first and second grades of Yucai No.1 Primary School, recorded 15 segments of student-student dialogue, and selected 7 high-quality video clips for in-depth analysis. These videos were carefully chosen and designed: prior to recording, researchers communicated with the teachers to determine which segments and students to film, and teachers pre-planned their overall approach and key considerations for organizing student-student dialogue to ensure proper preparation. The selected videos represent different types of lessons for first and second grades and are typical examples of student-student dialogue [5].

This study adopted the Flanders Interaction Analysis System, with modifications to its classification system to suit the research context. The selected videos were refined, organized, and coded: samples were taken every 20 seconds, and each video was segmented and coded

accordingly. NVivo 10 software was used to establish a tree node system, which was divided into 3 main categories and 5 subcategories [6]:
Information Flow: One-way Flow; Two-way Flow
Process Participation: Thinking Level; Participation & Communication Status; Listening Status; Student Verbal Expression
Effect Evaluation: Problem Analysis Level
Sub-nodes were created for each category. Two experienced teachers independently analyzed and coded each 20-second segment; any discrepancies were discussed until a consensus was reached. Coding was conducted in accordance with the above system, resulting in the data presented.
The data was input into NVivo 10, and the software's data analysis function generated Figure 11.
As shown in Figure 11, during student-student dialogue, students performed well in listening, problem analysis, thinking, and verbal expression-showing distinct advantages in these areas. This can be attributed to two factors: the selected students were high-performing, and the dialogue design was effective. During dialogue (especially peer-to-peer dialogue between desk mates), students were more likely to maintain attention and engage in thinking. The support of a peer and the relative equality of one-on-one interaction created an ideal environment for clear and coherent problem analysis. Ultimately, this confirms the significant role of student-student dialogue in enhancing students' learning outcomes.
For Example:

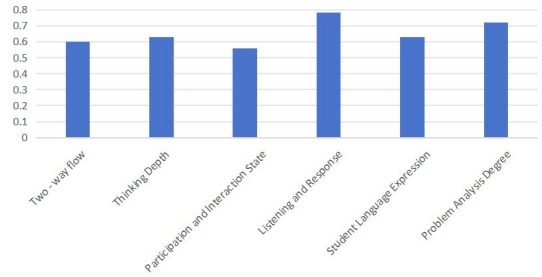

Figure 11. Analysis of Video of Student-Student Dialogue in Lower Grades Primary School Mathematics Classes

Figure 11 also shows that while two-way information flow was dominant among students, one-way flow still accounted for a large proportion. This indicates that student-student dialogue in current classrooms is not yet ideal: it lacks sufficient breadth and depth, and students' participation, interaction, and the intellectual depth of their dialogue are inadequate. Potential contributing factors include students' young age (leading to low interest), unequal dialogue platforms, and other issues. To address these problems, Teachers need to be alert to opportunities for improvement, reflect deeply on effective strategies to promote student-student dialogue, and ensure that such dialogue is practical and efficient.
In conclusion, video analysis of student-student dialogue confirms that students excel in listening, problem analysis, thinking, and verbal expression during such interactions. However, the coexistence of dominant two-way flow and significant one-way flow highlights the need to enhance the breadth, depth, participation, interaction, and intellectual rigor of student-student dialogue.

2. Cultivation Strategies for Student-Student Dialogue

Every task requires appropriate methods and strategies, and organizing student-student dialogue is no exception. This section elaborates on the key principles for guiding student-student dialogue in classrooms and the basic strategies for organizing such dialogue, from three perspectives.

2.1 Four Principles for Guiding Student-Student Dialogue Adhering to the following four principles will significantly enhance the substance and effectiveness of student-student dialogue:

- Selected Dialogue Content: Teachers carefully select dialogue topics or promptly identify emerging issues that are appropriately challenging, engaging for students, and require critical thinking.
- Focused Dialogue Questions: Dialogue should revolve around a specific link or question in the lesson, ensuring efficient focus on core issues.
- Diversified Dialogue Forms: Include group dialogue, whole-class dialogue, and occasional cross-group dialogue.
- Inclusive Dialogue Participation: Ensure students of different academic levels and personalities have opportunities to participate, think, listen, and speak—empowering all students to take ownership of the dialogue.

2.2 Basic Strategies for Organizing Student-Student Dialogue Effective Organizational Strategies Are Essential for Success.

To promote more efficient and high-quality student-student dialogue, the following practical strategies for organizing, guiding, and evaluating dialogue are proposed.

2.2.1 Cultivate standardization and orderliness in student-student dialogue

Mathematics is a discipline that fosters logical thinking, and mathematical language should be standardized and organized. During dialogue, students should speak loudly, express their views confidently and openly, listen patiently to peers without interrupting, and bravely raise questions or share their opinions after others speak. When students make mistakes in language standardization (e.g., incoherence) or go off-topic, teachers should provide timely guidance to keep the dialogue on track and focused on the core question. Ultimately, this will enhance students' thinking, refine their language skills, create a lively classroom atmosphere, and build a harmonious learning environment.

For example, role-play-based student-student dialogue is highly effective for lower primary grades. Many mathematics problems for young students are presented in contextual scenarios; analyzing these problems can involve acting out the scenario, simulating a "judge's trial" to discuss true/false questions, or making presentations [7].

2.2.2 Enhance the depth and breadth of student-student dialogue students should develop their own insights into knowledge, rather than stopping at superficial understanding-striving for greater depth and broader perspectives.

Conflicts or disagreements may arise during student-student dialogue; teachers can use these emerging issues as entry points to increase student interest, expand their intellectual participation, and encourage them to express their positions, views, or doubts. Through listening, refutation, questioning, and debate, students will gain a deeper and more comprehensive understanding of knowledge. This requires building a democratic and harmonious classroom atmosphere [8].

Debate-based student-student dialogue is the most effective strategy for expanding the depth and breadth of knowledge. During teaching, when discussion content expands and conflicting or opposing viewpoints emerge, teachers can organize debate-style dialogue: divide students into pro and con teams, allow each team to present their arguments and refute the opponent's views, and form a judging panel consisting of the teacher and some students.

2.2.3 Increase student participation and ensure appropriate teacher regulation interest is the best teacher—when students are interested in the content, they will actively participate in discussions.

Teachers' guidance is crucial: before dialogue, they should clarify requirements and explain questions clearly; during dialogue, they should provide guidance, regulation, follow-up questions, and enhancements; after dialogue, they should summarize, generalize, and evaluate. Clear guidance helps students understand expectations, boosting their enthusiasm and engagement.

To build trust and positive emotions with students, teachers must establish good teacher-student relationships, show acceptance and respect, and integrate their care, patience, insight, and wisdom into classroom practice. Only through such effective classroom communication can students gain new knowledge and motivation, infusing the classroom with vitality.

For example, when teaching students to recognize "angles," a teacher used a compass and an extendable pointer to create teaching tools, guiding students to discuss "what factors affect the size of an angle." The students' eagerness to learn and excitement about the question were inspiring: the classroom was filled with focused, attentive discussion and meaningful student-student dialogue, leaving a deep impression. Through discussion and presentations, students' thinking became clearer and their understanding of the knowledge more solid—creating a vibrant learning scene [9].

To promote effective classroom dialogue, teachers must not only give students the right to speak but also be willing and able to listen to them. Shifting from "monologue teaching" to "dialogue teaching" requires addressing the issue of teachers' inattentive or inappropriate listening. Instead of commanding or instructing, teachers should become attentive listeners to students, paying close attention to every voice, viewpoint, and insight. By truly listening with care, teachers can nurture students' growth with love and wisdom, waiting patiently for their potential to bloom.

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