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Classroom Loudness Among Children Aged 10–12 and the ZPD-ZQR Framework: A Single-Case Reflective Qualitative Study

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Abstract
Classroom loudness is common in middle childhood, yet its educational meaning remains contested because classroom talk may support participation while excessive noise may disrupt concentration. This study examines how developmental social orientations among children aged 10–12 manifest as classroom loudness and how such loudness shapes learning processes. Using a reflective qualitative design, the study conducts a single-case narrative-theoretical analysis based on a student author's lived classroom experience, reflective notes, and interpretation through Vygotsky's sociocultural theory and Piaget's constructivist theory. The findings show that classroom loudness emerges from peer-oriented participation, verbal expressiveness, and collaborative activity; that classroom sound has a dual character as both engagement and distraction; that its effects depend on learning activity; and that excessive noise reduces focused listening and reflective thinking. Based on these findings, this article proposes the ZPD-ZQR framework as a conceptual model for balancing guided social interaction within the Zone of Proximal Development and structured quiet reflection within the Zone of Quiet Reflection. Because the study is based on a single reflective case, its contribution lies primarily in interpretive and conceptual insight rather than broad empirical generalization.

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Introduction

The classroom is not only an instructional setting but also a social environment in which students form relationships, negotiate participation, and develop a sense of belonging. Research on school belonging shows that students' experiences of connection, participation, and identification within school are closely related to academic, behavioural, and psychological outcomes. In this sense, classroom life should be understood not only in terms of content delivery, but also in terms of the social conditions that shape how students engage with learning (Monteiro et al., 2021; Štremfel et al., 2024).

This social dimension becomes especially salient among children aged 10–12, a developmental period situated between late childhood and early adolescence. At this stage, peer relationships become increasingly important for social-emotional development, identity formation, and participation in everyday school life. Recent research also indicates that the period from approximately 8 to 14 years is a particularly important transition phase, even though it is often underexamined in educational intervention literature. In classroom settings, this developmental tendency may appear as greater responsiveness to peers, more expressive verbal interaction, and stronger participation in collaborative activity (Neri Tejada et al., 2024; Pollak et al., 2023).

As a result, classroom learning at this age often unfolds in an atmosphere filled with voices, comments, questions, laughter, and spontaneous discussion. For some students, this soundscape may support engagement, participation, and shared meaning-making. For others, however, it may become a source of distraction that interferes with concentration and comprehension. This contrast suggests that classroom loudness should not be viewed only as a behavioural problem. It should also be understood as a developmental and pedagogical phenomenon that emerges from the interaction between children's social orientation and the structure of classroom activity.

The importance of this issue is supported by a growing body of research showing that noise affects children's academic and cognitive performance, including attention, memory, comprehension, and overall learning effectiveness (Fernández-Quezada et al., 2025; Fretes & Palau, 2025). Children and adolescents are especially sensitive to auditory distraction because their cognitive and linguistic capacities for filtering competing sound are still developing (Gheller et al., 2023; Rance et al., 2023). In addition, poor classroom acoustic conditions may increase listening effort and reduce students' comfort and wellbeing in the learning environment (Mealings, 2023a; Mercugliano et al., 2025). However, not all classroom sound has the same educational implications. Some forms of sound emerge from meaningful learning activities such as peer discussion, collaborative problem solving, and guided teacher interaction, whereas other forms of sound are excessive, off-task, and more likely to disrupt attention and reduce students' ability to process instruction (Mealings, 2023b, 2023a; Visentin & Prodi, 2026).

Despite these insights, previous studies have tended to examine classroom noise mainly in terms of acoustic quality, cognitive performance, or general learning outcomes, while giving less attention to how everyday classroom practice should balance productive social interaction with opportunities for quiet cognitive reflection. Likewise, although peer relationships and classroom participation are widely recognized as important in middle childhood, less attention has been given to how these developmental characteristics contribute specifically to classroom

loudness as an educational condition rather than merely a disciplinary issue. This leaves an important interpretive gap in understanding how classroom sound should be managed pedagogically in relation to both interaction and internalization.

In the Indonesian educational context, this issue is particularly relevant because contemporary curriculum directions increasingly encourage meaningful, student-centered, and participatory learning. Such pedagogical expectations may invite students to collaborate, discuss, ask questions, and express ideas during classroom activities. While these practices are educationally valuable, they may also produce more complex classroom soundscapes, especially among children aged 10–12 whose peer orientation and verbal responsiveness are developmentally salient. Therefore, classroom loudness in this context should not be reduced to a problem of discipline or acoustic disturbance alone. Rather, it should be examined as a pedagogical condition shaped by developmental social needs, classroom participation norms, and instructional design.

Addressing this gap is important because teachers do not simply manage behaviour; they also design the social and instructional conditions under which learning occurs. Research on supportive classroom environments suggests that students' engagement and school identification are shaped not only by individual characteristics, but also by classroom-level conditions. A clearer understanding of classroom loudness may therefore help educators distinguish between sound that supports learning and sound that undermines it, while also informing lesson design, transitions between activities, and expectations for participation and concentration (Monteiro et al., 2021; Štremfel et al., 2024).

This study is grounded in a theoretical tension between socially mediated learning and individual cognitive construction. Vygotsky's sociocultural theory emphasizes that learning develops through interaction, language, scaffolding, and participation with more capable peers or adults. From this perspective, classroom talk may function as a productive medium of meaning-making. Piaget's constructivist theory, however, highlights the learner's active internal organization of experience, suggesting that cognitive development also requires moments of individual processing, reflection, and equilibration. The problem of classroom loudness sits precisely within this tension: the same social interaction that may support learning can become excessive auditory stimulation when it interferes with attention, reflection, and internalization.

A reflective narrative approach is appropriate for this study because classroom loudness is not only an acoustic condition that can be measured externally, but also a lived learning experience perceived by students during instruction, discussion, and individual work. Quantitative acoustic measures may identify sound levels, but they may not fully capture how students experience the movement between participation, distraction, listening effort, and reflective thinking. For this reason, a single reflective case is used not to represent all classrooms, but to develop an interpretive and theoretically informed understanding of how classroom sound may shape learning experience from the learner's perspective.

Against this background, this study aims to examine how developmental social orientations among children aged 10–12 manifest as classroom loudness and how such loudness shapes the movement between socially mediated learning and individual cognitive internalization. The study approaches this issue through the perspectives of Lev Vygotsky and Jean Piaget because these theories offer important but partial explanations of classroom sound.

Vygotsky helps explain the educational value of guided interaction, peer dialogue, and collaborative meaning-making, while Piaget highlights the importance of individual reflection, internal organization, and cognitive consolidation. Building on this theoretical tension, the article proposes the ZPD-ZQR framework as a way to conceptualize learning as a pedagogical rhythm between guided interaction and structured quiet reflection. More specifically, this study addresses two questions: (1) How do developmental social orientations among children aged 10–12 manifest as classroom loudness during learning activities? and (2) How does classroom loudness support or hinder the movement between socially mediated learning and individual cognitive internalization?

Method

This study employed a reflective qualitative design using a single-case narrative-theoretical analysis to examine classroom loudness among children aged 10–12 and its relationship with learning processes. This design was selected because the study did not aim to measure classroom sound acoustically or produce statistical generalization, but to interpret how classroom loudness is experienced by a learner in everyday instructional situations. A reflective qualitative approach was considered appropriate because classroom loudness is not only an external sound condition, but also a lived learning experience involving participation, distraction, listening effort, peer interaction, emotional response, and individual reflection. The study was based on the lived classroom experience of the student author as a single reflective case in an Indonesian school context. The case focused on recurring classroom situations, including whole-class instruction, teacher explanation, peer discussion, collaborative tasks, reading, writing, and individual work, because these activities represented different sound conditions and learning demands. The primary data consisted of reflective notes written by the student author, which documented repeated experiences of classroom sound, such as peer interaction, overlapping voices, teacher instruction, collaborative discussion, off-task talk, distraction, and situations requiring quiet concentration. The notes also recorded the learner's responses to sound conditions, particularly when sound supported participation or interfered with listening, comprehension, attention, and reflective thinking. The analysis followed a narrative-theoretical procedure: the reflective notes were read repeatedly to identify recurring situations related to sound and learning; meaningful units were grouped into preliminary categories, including peer-oriented participation, productive classroom talk, excessive or off-task noise, activity-specific sound demands, and difficulties in concentration; and these categories were interpreted through Vygotsky's sociocultural theory, Piaget's constructivist theory, and cognitive load theory. The emerging interpretation was then organized into four thematic patterns and synthesized into the proposed ZPD-ZQR framework, which conceptualizes learning as a pedagogical rhythm between guided social interaction and structured quiet reflection. To strengthen transparency, brief narrative excerpts from the reflective notes were included in the Results section, while the analysis distinguished between reflective description and theoretical interpretation. Because the study relied on one reflective case and did not include external classroom observation, formal acoustic measurement, or comparative classroom data, the findings should be understood as interpretive, exploratory, and conceptual rather than statistically generalizable.

Results and Discussion

Results

Four main findings emerged from the reflective narrative analysis. These findings relate to patterns of classroom participation, the varied character of classroom sound, the relationship between sound and learning activity, and the learner's experience of concentration. To strengthen the transparency of the analysis, brief reflective excerpts from the student author's notes are included to illustrate the main patterns.

First, classroom loudness frequently appeared in connection with peer-oriented participation and spontaneous verbal interaction. Students aged 10–12 were experienced as responding quickly to classmates, speaking expressively, and participating actively in discussion and collaborative activity. Loudness became noticeable when students reacted to one another immediately, exchanged comments during tasks, or joined classroom talk at the same time. As reflected in the student author's notes, *"In classroom activities, especially during group discussion and project work, the class often became louder because students were actively responding to one another. The noise did not always feel like misbehavior; sometimes it showed that students wanted to participate, talk with friends, and be involved in the task."* This finding shows that classroom loudness was not always associated with intentional misbehavior, but often emerged from students' desire to respond, belong, participate, and be recognized by peers during classroom interaction.

Second, classroom sound was not experienced in a uniform way. In some situations, sound accompanied meaningful participation, such as when students explained ideas to peers, asked questions, responded to the teacher, or worked collaboratively on tasks. In other situations, the sound environment became excessive, overlapping, and off-task, making it difficult to hear instructions clearly and maintain focus on the lesson. The student author noted, *"I began to see that classroom noise was not only a distraction. Sometimes it showed that students were learning through social interaction. However, when too many students talked without structure, the sound became confusing and made it difficult to understand the lesson."* This finding indicates that classroom sound had a dual character: it could support participation when connected to learning activities, but it could also become disruptive when excessive, unstructured, or unrelated to the task.

Third, the effect of loudness varied according to the type of learning activity and the character of the sound itself. During group discussion, brainstorming, and peer work, moderate sound often included turn-taking, short peer responses, brief laughter, and task-related explanation. In these situations, sound tended to support participation because students used talk to test ideas, clarify meaning, and respond to one another. However, when moderate sound shifted into overlapping talk, repeated side conversations, humming, calling across the room, or shouting, the same sound condition became more disruptive. During teacher explanation, reading, writing, and individual consolidation, even moderate sound was experienced as more intrusive because these activities required sustained listening, information processing, or independent thinking. As stated in the reflective notes, *"The sound felt different depending on the activity. During group discussion, talking with friends could help me understand ideas faster.*

But when I had to listen to the teacher, read, or work alone, too much talking made it harder for me to focus."

Fourth, excessive classroom noise was associated with difficulties in understanding lessons, maintaining attention, and thinking clearly. These difficulties were especially noticeable when important instructions were being delivered or when individual work required concentration. The reflective narrative showed that noisy classroom moments could reduce opportunities for focused listening and make it harder for the learner to follow the flow of learning. The student author reflected, *"Based on my experience as a student, I often had difficulty understanding lessons because I was distracted by the voices of my peers. I could focus better when working alone, especially when the task required quiet thinking and concentration."* This finding suggests that excessive classroom sound did not merely disturb classroom order, but also reduced the learner's opportunity for focused listening, reflective thinking, and internal cognitive processing. These findings provide the basis for the later discussion of the ZPD-ZQR framework.

Discussion

The findings of this study confirm that the organizational culture within the Subject Teacher Consultation Forum and school leadership practices function as strategic determinants in improving the performance of Physical Education teachers. The results demonstrate that collaborative interaction among teachers, professional communication, and empowerment practices contribute significantly to strengthening instructional performance. Active participation in professional communities allows teachers to exchange pedagogical experiences and develop shared understandings of curriculum implementation. This collaborative environment supports continuous professional learning and reduces disparities in instructional quality among schools. The dominance of interaction and communication dimensions indicates that professional collaboration is not merely administrative but serves as a mechanism for improving teaching effectiveness. These findings reinforce the perspective that organizational culture shapes professional behavior through shared norms and collective responsibility. Consequently, a strong professional culture becomes an essential foundation for improving educational service quality.

The role of principal leadership further strengthens the influence of organizational culture on teacher performance. Leadership practices characterized by effective communication, empowerment, and professional support create a positive organizational climate that encourages innovation and instructional improvement. In line with William G. Scott's conception of leadership as a process of influencing group activities toward goal achievement, principals act as facilitators who align teacher efforts with institutional objectives. Similarly, Rauch and Behling emphasize leadership as the process of influencing organized groups to achieve shared goals, which is reflected in principals' efforts to motivate and guide teachers. When principals provide opportunities for participation and recognize teachers' professional contributions, teachers demonstrate higher engagement and commitment. Such leadership practices foster trust and collaboration within the school environment. As a result, teachers become more confident in implementing innovative learning strategies.

The findings also highlight that professional collaboration within the Subject Teacher Consultation Forum supports teacher empowerment by creating opportunities for reflective practice and shared problem-solving. Through structured discussions and joint planning activities, teachers develop adaptive teaching strategies that respond to diverse student needs and varying school resources. This collaborative culture strengthens professional identity and encourages continuous competence development among Physical Education teachers. The results suggest that teacher performance improves when professional learning communities function effectively as platforms for knowledge exchange and innovation. Moreover, organizational culture promotes collective accountability, ensuring that improvements in teaching practices are sustained over time. These outcomes indicate that professional forums serve not only as coordination mechanisms but also as drivers of pedagogical transformation. Therefore, strengthening professional collaboration structures is essential for long-term educational improvement.

Overall, this study demonstrates that the interaction between organizational culture and principal leadership creates a mutually reinforcing system that enhances teacher performance. A supportive professional culture provides the foundation for collaboration, while effective leadership ensures direction, motivation, and institutional support. Teachers who experience open communication and professional recognition are more likely to engage actively in curriculum development and instructional innovation. These findings imply that improving educational quality requires simultaneous attention to organizational and leadership dimensions rather than focusing solely on individual teacher competence. In practical terms, schools should encourage collaborative professional communities while strengthening leadership capacity among principals. By integrating strong organizational culture with transformational leadership practices, schools can foster sustainable professional growth among teachers. Ultimately, this synergy contributes to improved learning outcomes and more effective educational services.

Conclusion

This study concludes that classroom loudness among children aged 10–12 should be understood as a developmental and pedagogical phenomenon rather than merely a disciplinary problem. The findings suggest that loudness often emerges from peer interaction, verbal participation, and collaborative activity, but may hinder learning when it disrupts concentration, listening, and reflective processing. By bringing together Vygotsky's emphasis on social interaction and Piaget's emphasis on internal cognitive construction, this article proposes the ZPD-ZQR framework as a conceptual way of understanding how learning may be strengthened through a balance between guided interaction and quiet reflection. In practical terms, the study suggests that teachers can manage classroom sound as part of lesson design by aligning discussion, transition, and reflection phases with different sound expectations. However, because this study is based on a single reflective case and does not include formal acoustic measurement, external classroom observation, or comparative classroom data, its findings should be interpreted as conceptual and exploratory rather than broadly generalizable. Further research may examine the ZPD-ZQR framework in broader classroom contexts through

observation, student interviews, teacher interviews, acoustic documentation, and mixed-method approaches.

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Authors' Note

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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