

Analysis Of The Interaction Of The Learning Environment On The Cognitive Development Of Grade II Students At SDN 3 Gondang In The 2025/2026 Academic Year

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Abstract

Cognitive development is a fundamental aspect that must be nurtured from an early age. A conducive learning environment encompassing physical, social, and academic dimensions plays a vital role in stimulating students' cognitive development. This study aims to: (1) describe the general state of the learning environment (physical, social, and academic) in the second-grade class at SD Negeri 3 Gondang; (2) identify the factors that support and hinder the creation of a conducive learning environment; and (3) analyze the impact of the learning environment interaction on the cognitive development of second-grade students at SD Negeri 3 Gondang. This study employs a qualitative approach with a descriptive research design. The research subjects consisted of 22 second-grade students, the second-grade teacher, and the school principal. Data were collected through participant observation, in-depth interviews, and document analysis. The research was conducted from June 8 to June 15, 2026. Data analysis utilized the Miles and Huberman model, comprising data condensation, data display, and conclusion drawing. Data validity was verified through triangulation of sources, techniques, and time. The research results indicate that the learning environment in the second-grade class at SD Negeri 3 Gondang is generally in good condition. The physical environment features a clean and tidy classroom, adequate lighting, good air circulation, and available basic facilities. The social environment is characterized by positive teacher-student interactions and a conducive classroom atmosphere, although some students remain less active. The impact of the learning environment interaction on students' cognitive development is highly positive. A conducive physical environment helps students maintain focus and concentration. A positive social environment encourages active student participation and facilitates the understanding of subject matter. A supportive academic environment facilitates the development of students' thinking skills, understanding, and problem-solving abilities.

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1. INTRODUCTION

Education is the primary foundation for building a nation's civilization. From the beginning of life, humans are inseparable from the educational process, as it is through education that the values of knowledge, skills, and culture are passed down from one generation to the next (Sulkifly, 2021). In the context of an increasingly complex and challenging life, education is no longer viewed merely as the transfer of knowledge (teaching), but rather as a conscious effort to shape an individual's personality, intelligence, and noble character.

Etymologically, the term "education" comes from the Greek word "paedagogie," which consists of the words "paes" (child) and "agogos" (to guide), meaning guidance given to children. Meanwhile, in Latin, "education" comes from the word "educatum," which refers to efforts to develop one's potential from within toward a better future (UPY Elementary School Teacher Education Lecturer Team, 2022). This definition demonstrates that the essence of education is the process of guiding and developing human potential from an early age, particularly during elementary school.

Education, by its very nature, cannot take place in a vacuum or in isolation; it requires interaction as an essential medium for the transfer of knowledge, internalization of values, and character formation of students. Interaction in the educational context is not limited to the two-way relationship between teacher and student in the classroom but encompasses a broader communication network. Educational interaction is interaction that occurs within a bond for educational and teaching purposes, and therefore needs to be distinguished from other forms of interaction (Sardiman, 2021). Therefore, the interactions that occur in the learning process cannot be separated from the learning environment, as the environment serves as the space and context in which these interactions take place.

Bloom and Noriana (2021) explain that the learning environment is one of the important factors to consider regarding the continuity of the classroom learning process. The learning environment is a set of external conditions, influences, and stimuli that impact students, including physical, social, and intellectual factors. A conducive learning environment plays a crucial role in stimulating students' cognitive development because it provides the necessary stimuli to activate thinking, remembering, and problem-solving processes. A positive learning environment makes students feel safe, comfortable, and more enthusiastic. Furthermore, the availability of adequate facilities can significantly contribute to students' cognitive development and learning motivation.

In addition to physical factors, social interactions within the learning environment also play a crucial role in students' cognitive development. Lev Vygotsky (in Wardani et al., 2023) stated that children's cognitive development is significantly influenced by social interactions between students and teachers and with peers. Through these interactions, students can construct new understandings, develop thinking skills, and improve problem-solving skills. This finding is supported by various previous studies, such as Rina Nurmalina's (2021) study, which concluded that the school learning environment significantly influences the cognitive development of lower-grade children. Similarly, research by Miftahul Jannah & Zulkifli (2022) emphasized the positive impact of educational interactions on the concrete thinking skills of children aged 7-8 years.

Similar research by Siti Aisyah (2024) found that peer interaction plays a vital role in social cognitive development. Meanwhile, Dewi Lestari et al. (2023) analyzed in depth how the physical and social environment contributes to cognitive learning outcomes. Furthermore, M. Rizki Maulana & Neneng Sri Wulan (2025) highlighted the effectiveness of interaction-based environments during the post-pandemic transition period. Unlike previous research, which predominantly used a quantitative approach or focused on only one type of interaction, this study takes a comprehensive qualitative approach that examines physical, social, and academic interactions holistically within the scope of primary education.

Based on initial observations conducted at SDN 3 Gondang on March 7, 2026, researchers found a problem: second-grade students' cognitive development was delayed in responding to newly taught material, even after repeated practice. This was strongly suspected to be influenced by interaction patterns that occurred during the learning process. For example, when the teacher explained in front of the class, some students tended not to listen or were distracted, resulting in cognitive delays. Of the 22 students, the majority showed indications of delayed understanding

that required pedagogical intervention. This pattern is consistent with more established findings in the literature rather than being an isolated classroom impression: Miftahul Jannah & Zulkifli (2022) empirically linked disengaged, largely one-way teacher-student interaction to slower acquisition of concrete-operational concepts among children aged 7-8 years, and M. Rizki Maulana & Neneng Sri Wulan (2025) similarly found that the quality of interaction-based learning environments, rather than mere exposure to material, was the stronger predictor of early cognitive achievement during the post-pandemic transition period. Read together, these studies suggest that the delays observed at SDN 3 Gondang are unlikely to stem from repetition alone, but more plausibly from the quality of environmental interaction surrounding that repetition, which motivates the present study's focus on interaction rather than instructional content per se.

Based on the description above, this study aims to describe the general picture of the learning environment, identify supporting and inhibiting factors, and analyze the impact of learning environment interactions (physical, social, and academic) on the cognitive development of second-grade students at SDN 3 Gondang in the 2025/2026 Academic Year.

2. METHOD

The approach used in this study was a qualitative descriptive approach. This approach was chosen because the research aims to deeply understand the interaction phenomena that occur in the learning environment and their influence on students' cognitive development naturally, without manipulating variables. According to Moleong (2022), qualitative research aims to holistically understand the phenomena experienced by research subjects in their natural context. In line with this, Sugiyono (2021) and Creswell (2021) state that qualitative methods emphasize the exploration of in-depth meaning rather than statistical generalization.

The research was conducted at SDN 3 Gondang, North Lombok Regency, West Nusa Tenggara Province. The research took place during the even semester of the 2025/2026 academic year, specifically from June 8 to June 15, 2026. The research subjects consisted of 22 second-grade students (12 boys and 10 girls), the second-grade teacher (Mrs. Tesy Frihesty, S.Pd. Gr.), and the Principal of SDN 3 Gondang. Subjects and key informants were selected using a purposive sampling technique. All 22 students in the class were included as the unit of observation because the study examined the learning environment as a whole rather than individual student profiles, so no sampling was applied at the student level. The classroom teacher was selected as the primary informant because she was the sole educator directly responsible for daily instruction and classroom management in the observed class, giving her the most direct and continuous exposure to the interaction patterns under study. The school principal was selected as a secondary informant based on her managerial authority over facility provision and school-level policies that shape the physical and academic learning environment. Informants were deemed adequate once responses across interviews began to converge and no new information relevant to the research questions emerged (data saturation).

Primary data sources were obtained from interviews and direct observations in the field, while secondary data were collected through documentation studies in the form of school profiles, teaching modules (RPP), and activity photos. Data collection techniques used included: (1) Participatory observation, to directly observe activities, physical conditions of the class, social atmosphere, and cognitive involvement of students during learning; (2) Structured in-depth interviews with key informants; (3) Documentation to strengthen the findings of observations and interviews. These procedures were carried out in four sequential stages. First, an entry and rapport-building stage (June 8), during which researchers introduced the study to the teacher and principal and obtained informed consent. Second, an observation stage (June 9-11), in which researchers conducted participatory observation across three class sessions to record the physical, social, and academic conditions of the classroom. Third, an interview stage (June 12-13), in which structured in-depth interviews were conducted separately with the classroom teacher and

the principal, guided by an interview protocol developed from the research objectives. Fourth, a documentation and verification stage (June 14-15), in which school profiles, teaching modules (RPP), and activity photographs were collected, and initial findings were cross-checked with the teacher through member checking to confirm accuracy before analysis began.

Data analysis was conducted using the Miles and Huberman model (in Bahar Agus et al., 2021; Feny Rita, 2022), which consists of three stages: (1) Data Condensation to simplify interview and field data; (2) Data Display to organize data systematically; and (3) Conclusion Drawing, which was re-verified with field findings. Data validity was tested using source triangulation, technical triangulation, time triangulation (Helaluddin et al., 2021), and member checking techniques.

3. RESULTS AND DISCUSSION

Research result

Based on observations and interviews conducted during the period of June 8–15, 2026, comprehensive findings were obtained regarding the general description of the learning environment, supporting and inhibiting factors, and the impact of their interactions on students' cognitive development.

Overview of the Physical, Social, and Academic Learning Environment. Physically, the learning environment in grade II of SDN 3 Gondang is considered good. The classroom has good air circulation and natural lighting from two windows. The class teacher confirmed, "We always try to keep this classroom clean and tidy. Every morning the children clean the classroom." However, the availability of supporting facilities such as interactive learning media (teaching aids) is still limited and often relies on two-dimensional images on the blackboard.

From a social perspective, teacher-student interactions are quite warm. Teachers often use varying intonations to stimulate interest in learning. However, classroom interactions are often one-way. "These interactions are sometimes one-way, depending on the students' circumstances," said a second-grade teacher. Interactions between students also vary; some are very active in groups, while others are passive. The classroom atmosphere is generally pleasant, although distractions from outside noise can sometimes occur.

In terms of the academic environment, the cognitive abilities of second-grade students vary widely. When presented with simple arithmetic, some students respond quickly, while others require intensive guidance and repeated explanations from the teacher. This aligns with the concrete operational cognitive stage, which still requires real objects to construct mathematical understanding.

Supporting and Inhibiting Factors. There are several main supporting factors for creating a conducive learning environment at SDN 3 Gondang. Supporting factors include: (1) Creativity and competence of teachers who are patient and diligent in designing educational activities; (2) Full support from the principal in providing basic facilities; and (3) Enthusiasm of some students during the question-and-answer session. A student with the initials MI said, 'I like it when teachers ask questions. I like to answer.'

On the other hand, the inhibiting factors found include: (1) Limited media and concrete teaching aids; (2) A fairly large gap in basic cognitive abilities between students; (3) Problems with concentration and focus in students who are easily distracted by the external environment; and (4) Dominance of one-way communication in certain subjects.

The Impact of Learning Environment Interactions on Cognitive Development. A comfortable physical environment has been shown to directly support students' concentration (attention). A cool and bright classroom stimulates their cognitive readiness in the morning. The social environment, through the emotional closeness of teachers and students, reduces academic anxiety levels, making students more confident in asking questions and exploring ideas. Peer interaction during group work is very effective as a scaffold for understanding the material. Academic

environments designed to be repetitive have been shown to strengthen students' short-term memory retention and simple problem-solving abilities.

Discussion

The research results show that multidimensional interactions (physical, social, and academic) in the learning environment have a crucial impact on the cognitive development of lower-grade students. This finding confirms Bloom and Noriana's (2021) view that the learning environment is not just a physical place, but rather an ecosystem of stimuli that activates children's thinking circuits.

From the perspective of Jean Piaget's Cognitive Theory, children aged 7-8 years (second grade of elementary school) are in the concrete operational stage. Students at SDN 3 Gondang demonstrate concrete operational characteristics through their ability to understand logical instructions but are still highly dependent on tangible visual aids. The limited availability of concrete visual aids, which was a limiting factor in this study, significantly impacts the cognitive delays of some students who still have difficulty visualizing abstract concepts. Therefore, physical interaction with learning media occupies a central position. This pattern is directly reflected in the field data: students responded quickly to simple arithmetic when concrete or visual references were available, but required repeated, intensive guidance when instruction remained abstract or verbal, mirroring the concrete-operational profile Piaget describes. The finding also converges with Miftahul Jannah & Zulkifli's (2022) study of children aged 7-8 in MIN 2 Banda Aceh, which similarly reported that concrete thinking skills improved primarily when educative interaction was paired with tangible referents rather than verbal explanation alone; the present study extends that finding by showing the same pattern holds even where facilities are limited, suggesting that the interaction quality around the media, not merely the media's availability, is what drives comprehension.

Socially, the findings of this study align closely with Lev Vygotsky's Sociocultural Theory. Vygotsky (in Wardani et al., 2023) emphasized the concept of the Zone of Proximal Development (ZPD) and scaffolding. In grade II of SDN 3 Gondang, students who were initially passive became more understanding when they were guided personally by teachers or taught by their peers through peer tutoring. Social interactions, both teacher-student and student-to-student, functioned as cognitive bridges that elevated students' understanding beyond their independent learning capabilities. This scaffolding process was directly observable in the field data: the class teacher noted that interactions were "sometimes one-way, depending on the students' circumstances," and it was precisely in the gaps left by that one-way pattern that peer tutoring appeared to compensate, with initially passive students becoming more engaged once guided individually by the teacher or explained to by a classmate. This is consistent with Rina Nurmawati's (2021) conclusion that the school learning environment significantly shapes the cognitive development of lower-grade children, and it sharpens that general claim by identifying the specific mechanism at work in this classroom: it is not the learning environment as a whole but the availability of within-ZPD guidance, whether from teacher or peer, that appears to convert a merely conducive environment into actual cognitive gains.

Teacher creativity as classroom managers (Mulyasa, 2021; Sanjaya, 2023) has been shown to minimize the negative impacts of limited facilities. A pleasant classroom environment and positive relationships align with Slameto's (2021) view that healthy emotional conditions and social interactions can increase internal motivation, leading to improved retention and cognitive achievement.

Theoretical reflections on these findings reinforce the research of Siti Aisyah (2024) and Dewi Lestari et al. (2023), who stated that to optimize elementary school students' problem-solving abilities and cognitive memory, instructional design should not only focus on textbook content (academic environment), but should be constructed holistically along with the creation of a conducive classroom climate (physical) and democratic multidimensional communication patterns (social). The unity of these three environments triggers a maximal equilibration process (assimilation and accommodation) in the students' brains.

4. CONCLUSION

Based on the research results and discussion, it can be concluded that the learning environment in grade II of SDN 3 Gondang is generally in quite good condition and synergizes in influencing students' cognitive abilities. The physical environment is supported by healthy, clean, and well-circulated classrooms, although it still requires enrichment with concrete learning media. The social environment is characterized by a dialogic and warm relationship between teachers and students, which is able to foster a sense of psychological safety in learning. Meanwhile, the academic environment shows that varied learning methods have been proven to be able to stimulate students' critical thinking gradually.

The main supporting factors for creating this learning environment are teacher creativity, principal managerial support, and student enthusiasm. On the other hand, obstacles include limited variety of learning media, disparities in students' initial cognitive capacities, and distractions from the outside classroom environment. It is important to note that these conclusions are drawn from a qualitative descriptive study conducted in a single second-grade classroom at SDN 3 Gondang; as such, they describe the interaction patterns and conditions specific to this class in depth and should not be read as a claim that generalizes statistically to second-grade classrooms, schools, or regions beyond the setting studied.

Overall, the harmonious interaction between the physical, social, and academic environments observed at SDN 3 Gondang appears to have contributed positively to students' cognitive development, particularly in short-term memory skills, learning attention, and simple mathematical problem-solving (concrete operational stage), within the scope of the class studied. Whether similar patterns hold in other classrooms or schools would require further comparative research beyond the present single-site qualitative design. Therefore, ongoing synergy between teachers, parents, and the school is highly recommended to mitigate existing obstacles.

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