

Implementation of the Peripatetic Method to Reduce Learning Barriers for Students with Attention Deficit Hyperactivity Disorder (ADHD) at MIS Islamiyah Muhammadiyah Muncar, Banyuwangi

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as a contextual pedagogical strategy integrating movement, direct teacher guidance, and environmental learning experiences to support students with ADHD in Islamic elementary school settings. This study contributes to the literature on inclusive education by showing that movement-integrated IPAS instruction can serve as a practical, realistic, and pedagogically relevant alternative for reducing the learning barriers of students with ADHD in madrasah ibtidaiyah.

ABSTRACT

This study aims to analyze the implementation of the peripatetic method in reducing the learning barriers of a student with Attention Deficit Hyperactivity Disorder (ADHD) in science and social learning (IPAS) at MIS Islamiyah Muhammadiyah Muncar Banyuwangi. The study employed a qualitative approach with a case study design. The participants consisted of one fourth-grade student with ADHD characteristics as the main informant, supported by the classroom teacher, the school principal, and the student's parent. Data were collected through participatory observation, semi-structured interviews, and documentation, and were analyzed interactively through data condensation, data display, and conclusion drawing. The findings revealed that before the implementation of the peripatetic method, the student experienced learning barriers in the form of difficulty sustaining attention, being easily distracted, inconsistency in completing tasks, and a strong dependence on repeated teacher prompts during classroom-based IPAS instruction. The peripatetic method was implemented in a simple and contextual manner by utilizing the school environment as a learning space, engaging the student in movement-based activities, direct observation, and teacher-guided outdoor learning tasks. After the implementation, the student demonstrated positive changes in attention, responsiveness to instructions, learning engagement, and participation, although support and guidance were still needed in several situations. The originality of this study lies in positioning the peripatetic method not as a complex intervention, but

INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most common neurodevelopmental disorders among school-aged children and is characterized by difficulty sustaining attention, impulsive behavior, and excessive activity levels. This condition not only affects behavioral aspects but also has a direct impact on academic success, social interactions, and students' engagement in the learning process (Glenn, Thompson, and Mosley 2025).. Recent research indicates that students with ADHD are at a higher risk of academic failure, difficulty adapting to school demands, and various long-term consequences if they do not receive appropriate educational support (Fabiano et al. 2024).

In elementary education, the learning barriers experienced by students with ADHD often manifest as difficulty focusing on the teacher's instructions, a low ability to complete tasks consistently, being easily distracted by environmental stimuli, and limitations in controlling behavior during the learning process (Prasetyo and Dasnim 2022). These conditions pose a unique challenge for teachers because conventional teaching models, which center on sitting, listening, and note-taking tend to be ill-suited to the learning characteristics of students with ADHD. Various studies also report that elementary school teachers still face challenges in managing inclusive classrooms that include students with ADHD, particularly regarding the selection of instructional strategies capable of maintaining students' focus and engagement during learning activities (Ningrum 2023).

A number of studies have developed various approaches to address learning barriers faced by students with ADHD. Approaches based on the teacher-student relationship have been shown to contribute to increased academic engagement and positive learning behaviors among students (MacLean, Krause, and Rogers 2023). In addition, the use of assistive technology, artificial intelligence, virtual reality, and various digital media has also begun to be widely implemented to support the learning of students with special needs (Aprilia and Suwandayani 2025). However, the

implementation of such technologies often requires infrastructure, funding, and specialized expertise that may not be evenly available in elementary schools, particularly in madrasahs in rural areas.

Various studies in the fields of educational psychology and neuroscience indicate that physical activity is significantly associated with improvements in executive function, attention control, self-regulation, and academic performance among children with ADHD. (Chen et al. 2025) found that physical activity is positively correlated with improved executive function in children with ADHD. These findings are supported by (Pontifex et al. 2013), who demonstrated that sports activities can improve behavioral, neurocognitive, and academic performance in students with ADHD. Furthermore, a meta-analysis conducted by (Galitskaya et al. 2026) confirms that physical activity has a positive effect on ADHD symptoms, including aspects of attention and behavioral control.

From a pedagogical perspective, outdoor learning is also considered capable of enhancing student engagement, motivation, concentration, and meaningful learning experiences among elementary school students (Ashjae, Fattahi, and Derakhshanian 2024). The results of a systematic review (Miller et al. 2021) indicate that nature-based learning has a positive impact on students' cognitive, social, emotional, and academic development. These findings suggest that integrating physical activity with a dynamic learning environment has the potential to be a more suitable alternative for students with ADHD compared to learning that takes place entirely in the classroom (Aqmarina, Dharmawan, and Kom 2025).

A review of the literature reveals several research gaps. First, most studies on ADHD in an educational context focus primarily on behavioral interventions, teacher–student relationships, the use of assistive technology, and structured physical activities, whereas research on learning that utilizes walking and the school's surrounding environment as part of learning strategies remains relatively limited. Second, research linking physical activity to academic learning generally addresses its impact on neuropsychological or behavioral aspects but has not extensively examined how such activities are practically applied in subject-based learning in elementary schools, particularly for students with ADHD. Third, previous studies have rarely addressed the context of madrasah ibtidaiyah as a setting for implementing inclusive learning strategies for students with ADHD, even though the characteristics of these institutions, their resources, and their learning practices may differ from those of public schools.

Based on this gap, this study offers novelty in three aspects. First, this study examines the peripatetic method as a walking-based learning approach that utilizes the school's surrounding environment, which teachers employ to help reduce learning barriers for students with ADHD. Second, this study expands the discussion of physical activity for students with ADHD which has largely been framed as a behavioral intervention or physical exercise to position it as part of a pedagogical strategy within IPAS instruction. Third, this study provides an empirical overview of how the peripatetic method is applied in a simple, contextual, and realistic manner at an elementary madrasah to assist students with ADHD in the areas of attention, response to instructions, engagement, and participation in learning.

Therefore, this study aims to analyze the implementation of the paripatetic method in reducing learning barriers for students with Attention Deficit Hyperactivity Disorder (ADHD) in IPAS instruction at MIS Islamiyah Muhammadiyah Muncar, Banyuwangi. The research results are expected to provide a theoretical contribution to the development of inclusive learning based on physical activity and the environment, while also serving as a practical alternative for elementary madrasah teachers in adapting instruction to the learning characteristics of students with ADHD.

METHOD

This study employs a qualitative approach using a case study design to gain an in-depth understanding of the implementation of the paripatetic method in reducing learning barriers for students with Attention Deficit Hyperactivity Disorder (ADHD) in IPAS classes at MIS Islamiyah Muhammadiyah Muncar, Banyuwangi. This approach was chosen because it allows the researcher to examine learning phenomena holistically in a natural context and to understand the experiences, interactions, and meanings constructed by the research subjects during the learning process. The research focused on (1) the forms of learning barriers faced by students with ADHD prior to paripatetic learning, (2) the implementation of the paripatetic method in IPAS instruction within the madrasah setting, and (3) changes in students' learning behaviors following the instruction, particularly regarding attention, response to instructions, participation, and engagement in learning. The selection of the case study was based on the need to explore in depth the learning practices applied to a specific case so as to produce a comprehensive and contextual description.

The research subjects were selected using purposive sampling, which involves selecting informants based on their direct involvement in the learning process. The research informants included a fourth-grade student with ADHD as the primary informant, the fourth-grade teacher, the madrasah principal, and the student's parents. Research data were collected through participatory observation, semi-structured interviews, and a document review. Observations were conducted during the IPAS learning process, which employed the paripatetic method, to identify changes in learning behavior, attention levels, and student engagement. Interviews were conducted to obtain in-depth information regarding the experiences of teachers, parents, and students related to learning barriers and the implementation of the paripatetic method. Meanwhile, documentation including teaching modules, student progress records, assessment results, activity photos, and school documents was used to corroborate the findings from the observations and interviews.

Data analysis was conducted interactively using the Miles, Huberman, and Saldaña model, which includes the stages of data condensation, data presentation, and drawing and verifying conclusions. The analysis process was conducted continuously from data collection until the study was completed. Data validity was ensured through source triangulation, methodological triangulation, member checking, and peer debriefing to enhance the credibility of the research findings. In addition, the researcher engaged sufficiently in the field and compiled reflective notes throughout the research process to minimize researcher subjectivity. With these procedures, the study is expected to produce valid, in-depth findings that contribute to the development of inclusive learning strategies for students with ADHD in madrasah ibtidaiyah.

RESULTS AND DISCUSSION

The results of this study are organized around three main focuses: the learning barriers faced by students with ADHD prior to the implementation of the paripatetic method; the process of implementing the paripatetic method in IPAS instruction; and changes in students' learning barriers after instruction took place. The findings were obtained through observations during learning activities, interviews with classroom teachers and students' parents, as well as documentation in the form of assessments and photographs of learning activities. The presentation of these results is intended to provide a comprehensive picture of the students' initial conditions, the implementation of the paripatetic method in the madrasah setting, and the changes in learning behavior that emerged after students engaged in movement-based learning and utilized the school's surrounding environment.

1. Learning Barriers Faced by Students with ADHD Before the Implementation of the Peripatetic Method

Preliminary observations indicate that students with ADHD at MIS Islamiyah Muhammadiyah Muncar Banyuwangi experienced fairly noticeable learning barriers during IPAS lessons in the classroom. The most prominent barriers were observed in the areas of attention, concentration, and engagement in learning. When the teacher delivered material in a traditional lecture format, students tended to be able to focus only for a short time; their attention would then easily shift to other stimuli in their surroundings, such as objects in the classroom, their peers' activities, or the urge to move around. On several occasions, students were seen looking away, fiddling with their writing utensils, repeatedly changing their sitting positions, and failing to respond promptly to the teacher's instructions during lessons involving verbal explanations and written assignments.

In addition to difficulties with attention, students also struggled to maintain engagement until the task was completed. When given written assignments, students were able to begin the learning activity but were not always able to complete it consistently without guidance. Teachers had to remind students several times to return to the task at hand. This situation indicates that students' learning challenges lie not only in understanding the material but also in their ability to maintain focus, regulate their learning behavior, and sustain engagement in academic activities that last for extended periods in the classroom.

Interviews with classroom teachers reinforced these findings. Teachers explained that students find it more difficult to follow lessons when activities consist primarily of sitting, listening to explanations, and working on assignments at their desks for extended periods. Conversely, students appear easier to guide when learning involves hands-on activities, simple games, or activities that give them the opportunity to move around. Teachers also noted that students are more responsive when instructions are delivered directly with hands-on guidance, rather than when they are merely given general explanations in front of the class. These findings indicate that the learning characteristics of students with ADHD in the fourth grade at MIS Islamiyah Muhammadiyah Muncar Banyuwangi require a more flexible and concrete teaching approach that allows for physical movement.

Similar insights were also obtained from interviews with students' parents. Parents explained that children tend to understand things more easily when learning through hands-on activities rather than when asked to sit still for long periods to listen. At home, children are more interested in exploratory activities, playing outdoors, and observing their surroundings. Based on the results of observations, interviews, and documentation, the students' learning barriers prior to the implementation of the paripatetic method can be categorized into several aspects, namely difficulty sustaining attention, a tendency to be easily distracted, limitations in consistently completing tasks, and a high need for direct guidance and instruction from the teacher during the learning process.

2. Implementation of the Paripatetic Method in IPAS Learning

The implementation of the paripatetic method in this study was carried out simply by utilizing the environment surrounding the madrasah as a learning space. Teachers did not follow rigid steps but rather adapted activities to the students' conditions and the IPAS learning situation at that time. Learning began in the classroom with the presentation of the activity objectives and brief instructions regarding the activities to be carried out. Afterward, students were led out of the classroom to specific areas on the school grounds to participate in learning activities while moving around.

Throughout the activity, the teacher guided the students to walk to several predetermined points, stop at specific objects, and then listen to the explanations or

instructions provided. During this process, the students were asked to observe their surroundings, answer simple questions from the teacher, and participate in educational games related to the IPAS curriculum. The teacher also repeated the instructions several times, provided hands-on examples, and closely supervised the students to ensure they stayed on track with the learning activity.



Figure 1. Implementation of the Peripatetic Method in IPAS Learning

Figure 1 illustrates the implementation of IPAS learning in the madrasah's open-air area. The teacher accompanied the students throughout the activity and guided them to move from one point to another according to the prepared learning activities. The learning process was flexible, with instructions adjusted based on the students' responses in the field.

In addition to walking and observing the environment, the teacher also involves students in movement-based learning activities and simple games. These activities are designed to keep students engaged with the learning material without having to sit still for long periods of time. The teacher plays a crucial role in maintaining the flow of the activity, reminding students when their attention begins to wander, and providing reinforcement to keep students engaged in the learning process.



Figure 2. Student Engagement in Peripatetic Learning Activities

Figure 2 illustrates student engagement during the learning activities. Students participate directly in the activities within the madrasah environment while moving around, paying attention to the teacher's instructions, and taking part in activities related to the IPAS curriculum. In this context, the paripatetic method is implemented as outdoor learning based on movement, direct teacher guidance, and the use of the school environment as a learning resource.

After the learning activity is complete, the teacher conducts a simple assessment to gauge students' learning responses following the paripatetic learning experience. This assessment is used to observe students' ability to follow instructions, maintain attention, and complete tasks after participating in outdoor learning activities.

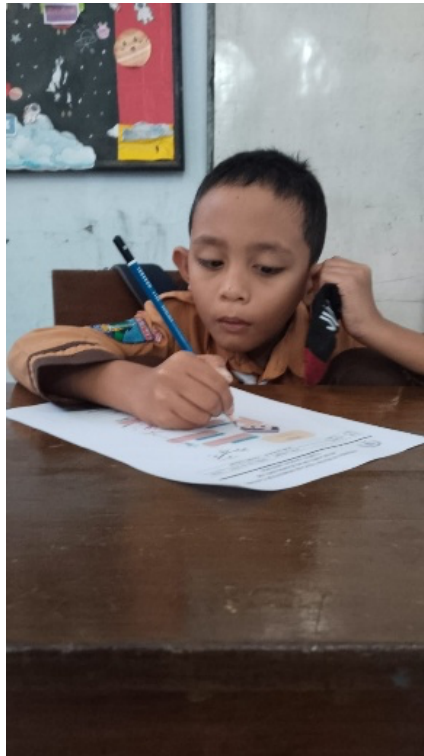


Figure 3. Assessment of Students with ADHD After Implementation of the Peripatetic Method

Figure 3 shows the assessment activity conducted after the implementation of the peripatetic method. This assessment forms part of the learning documentation to observe changes in students' learning responses after participating in movement-based learning within the school environment.

3. Changes in Students' Learning Barriers Following the Implementation of the Peripatetic Method

Based on observations during and after the lessons, there were positive changes in the learning behavior of students with ADHD after participating in lessons using the peripatetic method. The most noticeable changes were in the areas of attention and engagement in learning. Whereas during classroom instruction students tended to lose focus more easily and switch from one activity to another before completing a task, during paripatetic learning they appeared better able to follow the sequence of activities from start to finish. Students

continued to exhibit active behavior, but this energy was more effectively channeled into the ongoing learning activities.

Another change was observed in students' responses to the teacher's instructions. During outdoor learning, students responded more quickly to directions, found it easier to follow simple commands, and showed less resistance to learning tasks. When the teacher asked students to move to a specific location, observe an object, or answer a question, students appeared more willing to comply than when instructions were given during traditional classroom-based learning. This suggests that a learning format that allows for physical movement helps students stay engaged with the learning activities.

Assessment results following the implementation of the paripatetic method also showed changes in students' readiness to participate in follow-up activities. Based on teachers' observations, students appeared better able to sit and work on tasks in a more focused manner than before learning took place through out-of-class activities. Although they still required guidance in some areas, students demonstrated greater readiness to learn, were able to follow instructions more calmly, and completed learning activities with relatively fewer distractions.

Changes were also evident in student participation during instruction. Students became more active in answering questions, responded more frequently to the teacher's instructions, and were more engaged in instructional interactions. This engagement was not only evident physically through students' participation in activities but was also reflected in their willingness to pay attention, respond, and continue activities until completion. Teachers reported that during paripatetic learning, students were easier to guide, did not lose interest as quickly as usual, and were more enthusiastic about participating in IPAS lessons.

The results of interviews with teachers indicate that changes in students' learning behaviors do not mean that all learning barriers have completely disappeared, but there is a fairly clear difference compared to previous learning experiences. Teachers noted that students still require guidance and repeated instructions, but the intensity of the guidance needed is reduced when learning takes place while moving around outside the classroom. Teachers also observed that students are better prepared to participate in follow-up activities after their need for movement has been met through learning activities.

Feedback from parents further corroborated these observations. Parents reported that after participating in paripatetic learning, students seemed more enthusiastic about sharing their learning experiences at school. Students not only described the activities they had done but also showed an interest in recounting what they had seen and done during the learning sessions. This indicates that the learning experiences students gained through the paripatetic method left a deeper impression and were easier to remember compared to learning that took place passively inside the classroom.

Overall, the research findings indicate that the implementation of the paripatetic method has a positive impact on the learning barriers faced by students with ADHD in IPAS classes at MIS Islamiyah Muhammadiyah Muncar, Banyuwangi. This method does not eliminate all of the students' learning difficulties, but it helps reduce barriers in the areas of attention, engagement, response to instructions, and students' perseverance in participating in learning activities. In other words, the paripatetic method in the context of this study functions not as a complex intervention, but as a simple learning strategy that provides space for students with ADHD to learn through movement, direct guidance, and real-world experiences in the school environment.

The research findings indicate that the learning barriers faced by students with ADHD in IPAS classes at MIS Islamiyah Muhammadiyah Muncar, Banyuwangi, are primarily evident in their difficulty sustaining attention, tendency to be easily distracted, limited ability to consistently complete tasks, and high need for direct guidance from teachers. These conditions indicate that the main issues faced by students are not merely an inability to understand the material, but rather difficulties in managing their focus, maintaining engagement in academic activities, and adapting to a learning style that requires sitting still for long periods of time. These findings align with a study (Fabiano et al. 2024) that emphasizes that support for students with ADHD in school should be directed not only toward mastering the material but also toward structuring learning experiences that can sustain students' academic engagement. These findings also align with results (Tavlin, Ariol, and Lawson 2025) showing that teachers often face challenges when instruction is delivered through overly static formats, whereas students with ADHD require more direct, responsive, and flexible forms of interaction.

In the context of this study, the peripatetic method is not presented as a rigid and complex learning model, but rather as a simple strategy that allows students to learn while moving, following the teacher's guidance, observing their surroundings, and engaging in learning activities outside the classroom (HN and Patil 2026). This finding is significant because it demonstrates that support for students with ADHD does not always have to be provided through high-tech interventions, specialized devices, or complex instructional designs (Lestari et al. 2026). In practice, teachers need only utilize the madrasah environment, guide students as they move from one location to another, connect movement to IPAS content, and then provide questions and immediate feedback during the activity. In this sense, the paripatetic method is best understood as a form of movement-based contextual learning tailored to the characteristics of students with ADHD. These findings reinforce the results of a study (Ashjae et al. 2024) showing that outdoor learning can increase elementary school students' engagement because it provides a more concrete, less monotonous learning experience that is closer to students' real-life activities.

The changes observed following the implementation of the peripatetic method were primarily evident in students' increased ability to sustain their focus during learning activities, respond to teacher instructions, and engage more consistently throughout the learning process (Almuaqel 2023). In this study, while students were not entirely free from learning barriers, they demonstrated positive changes in the form of more focused attention, more stable engagement, and more active participation when learning took place while moving around outside the classroom. These findings suggest that learning environments that accommodate the need for movement can help students with ADHD stay engaged in academic activities. This aligns with a study (da Silva et al. 2025) showing that physical activity is associated with improved executive function in children with ADHD, particularly in the areas of attention and self-control. The findings of this study can also be interpreted within the framework of the results (Muriira et al. 2025) which confirm that physical activity has the potential to positively impact behavior, attention control, and academic performance in children with ADHD. However, while those studies largely addressed physical activity in the context of sports or exercise interventions, this study demonstrates that such movement elements can be simply incorporated into IPAS lessons through activities such as walking, moving between points, observing objects, and responding to the teacher's instructions.

The research findings also indicate that the effectiveness of the peripatetic method in this context lies not only in the element of "movement," but in the combination of movement, direct teacher guidance, and the use of the school environment as a learning resource. When learning takes place outside the classroom, teachers find it easier to approach students, repeat instructions, refocus students when they become distracted, and maintain student engagement directly. In other words,

changes in students' learning behaviors cannot be separated from the pedagogical relationships established during the learning process. This finding supports the results of a meta-analysis (MacLean et al. 2023), which emphasizes the importance of the teacher–student relationship in supporting students with ADHD symptoms. In this study, the peripatetic method proved effective not merely because students were taken for a walk, but because the walking activity was accompanied by consistent teacher guidance, reinforcement, and support. Therefore, this method is best understood as a learning strategy that facilitates more intense pedagogical interaction between teachers and students.

From the perspective of IPAS learning, the use of the madrasah environment as a learning space is also a key finding. Learning no longer takes place solely through verbal explanations in the classroom but through direct experiences that allow students to connect the material with real objects in their surroundings. For students with ADHD, this type of concrete learning experience makes it easier to maintain attention compared to abstract tasks that require prolonged sitting. This finding aligns with (Miller et al. 2021), which shows that nature-based learning and environment-based learning can have a positive impact on the cognitive and social development, as well as the engagement in learning, of elementary school-aged children. In the context of this study, the school environment functions not merely as a backdrop for activities but as a medium that helps bridge students' need for physical movement with the learning objectives of IPAS.

The main contribution of this study lies in how it positions the peripatetic method more realistically within the context of inclusive education in madrasah ibtidaiyah. This study does not portray the peripatetic method as a grand approach that must be implemented with complex tools, but rather as a simple learning strategy that teachers can implement using resources available at school. These findings make a theoretical contribution by broadening the discussion on learning support for students with ADHD—which has traditionally emphasized behavioral interventions, assistive technology, or physical activities—toward a form of academic learning integrated with movement, the environment, and pedagogical interactions. Meanwhile, the practical contribution of this study lies in the suggestion that elementary school teachers can adapt instruction for students with ADHD without having to wait for specialized facilities; teachers can begin by organizing more flexible learning activities, utilizing spaces outside the classroom, providing brief, repeated instructions, and incorporating physical movement as part of the learning process.

Thus, the findings of this study confirm that the peripatetic method in IPAS instruction should not be interpreted as an intervention that completely eliminates learning barriers for students with ADHD, but rather as a strategy that helps reduce these barriers by adapting teaching methods to the students' characteristics. This finding is significant because it demonstrates that, in the context of elementary madrasahs, inclusive learning can be built upon simple practices that are grounded in teachers' daily realities yet remain meaningful for the learning needs of students with ADHD. In other words, the contribution of this study lies not only in affirming that physical activities are beneficial for students with ADHD but also in explaining that physical activities combined with teacher guidance, concrete experiences, and a flexible learning environment can serve as a realistic and practical form of inclusive pedagogy in Islamic elementary schools.

CONCLUSION

This study concludes that the implementation of the peripatetic method in IPAS instruction at MIS Islamiyah Muhammadiyah Muncar, Banyuwangi, helps reduce learning barriers for students with Attention Deficit Hyperactivity Disorder (ADHD), particularly in terms of attention, response to instructions, engagement, and participation in learning activities. Through out-of-classroom learning that provides space for students to move around, observe their surroundings, and follow the teacher's instructions directly, students demonstrated positive changes in their engagement with the

learning process compared to when they were learning passively inside the classroom. These findings reinforce the view that learning approaches tailored to the movement needs of students with ADHD can serve as a relevant pedagogical strategy in inclusive education at elementary madrasahs. However, this study is limited to a single case of an ADHD student at one educational institution; therefore, its findings cannot yet be widely generalized. Consequently, future research is recommended to involve a more diverse group of participants and different school contexts to enrich our understanding of the application of the paripatetic method for students with special needs across various subjects.

REFERENCES

- Almuaqel, I. A. 2023. "Virtual Reality and Inclusive Learning of Individuals with Intellectual and Developmental Disabilities: A Review of Findings and the Path Ahead." *IEEE Transactions on Engineering Management* 71:13049–65. doi: 10.1109/TEM.2023.3243530.
- Aprilia, Y. D., and B. I. Suwandayani. 2025. "Strategies for Using Assistive Technology to Overcome Students with Learning Disabilities and Barriers in Elementary School." *Jurnal PAJAR (Pendidikan Dan Pengajaran)* 9(1):105–17. doi: 10.33578/pjr.v9i1.10102.
- Aqmarina, F., A. Dharmawan, and S. I. Kom. 2025. "Komunikasi Guru Terhadap Anak Attention Deficit Hyperactivity Disorder (ADHD) Di SD Muhammadiyah 2 Tulangan Sidoarjo." *The Commercium* 9(1):76–87. doi: 10.26740/tc.v9i1.64175.
- Ashjae, S., K. Fattahi, and F. Derakhshanian. 2024. "Investigating the Links between Outdoor Class and Learning in Primary School Students." *Journal of Adventure Education and Outdoor Learning* 24(2):232–48. doi: 10.1080/14729679.2022.2135117.
- Chen, S. C., C. W. Zhong, H. Li, X. Li, H. W. Fung, and L. Wang. 2025. "Parental Challenges in Raising Preschoolers with Attention-Deficit/Hyperactivity Disorder in Mainland China's First-Tier Cities: Qualitative Study Using Framework Analysis." *JMIR Formative Research* 9:e74047. doi: 10.2196/74047.
- Fabiano, Gregory A., Katherine Lupas, Brittany M. Merrill, Nicole K. Schatz, Jessica Piscitello, Erin L. Robertson, and William E. Jr. Pelham. 2024. "Reconceptualizing the Approach to Supporting Students with Attention-Deficit/Hyperactivity Disorder in School Settings." *Journal of School Psychology* 104:101309. doi: 10.1016/j.jsp.2024.101309.
- Galitskaya, V., G. Polydoros, A. S. Antoniou, P. Pergantis, and A. Drigas. 2026. "Brain-Computer Interfaces in Learning Disorders and Mathematical Learning: A Scoping Review with Structured Narrative Synthesis." *Applied Sciences* 16(8):3846. doi: 10.3390/app16083846.
- Glenn, A. L., O. K. Thompson, and T. K. Mosley. 2025. "Untreated ADHD Contributes to the School-to-Prison Pipeline and Related Racial Disparities." *Children and Youth Services Review* 169:108551. doi: 10.1016/j.childyouth.2025.108551.
- HN, N. K., and C. M. Patil. 2026. "Inclusive Learning through AI: A Comprehensive Review of Assistive Educational Technologies for Students with Neurodevelopmental Disorders and Other Disabilities." *Journal of Engineering Education Transformations* 39(Special Issue 2):332–40. doi: 10.16920/jeet/2026/v39is2/26041.

- Lestari, D., D. Aqmarina, L. L. Rezqi, R. F. Al-Aziz, T. Anggraini, Z. Putriyani, and A. D. I. Sari. 2026. "Peran Guru Kelas Dalam Mendampingi Siswa Dengan Karakteristik ADHD Di MIS Asyifa Kota Bengkulu." *Jurnal Pendidikan Inklusi Citra Bakti* 4(1):92–105. doi: 10.38048/jpicb.v4i1.6957.
- MacLean, J., A. Krause, and M. A. Rogers. 2023. "The Student-Teacher Relationship and ADHD Symptomatology: A Meta-Analysis." *Journal of School Psychology* 99:101217. doi: 10.1016/j.jsp.2023.04.007.
- Miller, N. C., S. Kumar, K. L. Pearce, and K. L. Baldock. 2021. "The Outcomes of Nature-Based Learning for Primary School Aged Children: A Systematic Review of Quantitative Research." *Environmental Education Research* 27(8):1115–40. doi: 10.1080/13504622.2021.1921117.
- Muriira, V., V. Nallisamy, S. Mwalw'a, and H. Kamundi. 2025. "Technology-Enhanced Education for Neurodiverse Learners: A Bibliometric Approach to Reducing Educational Inequalities." *Educational Process: International Journal* 18:e2025428.
- Ningrum, S. P. 2023. "Analisa Kendala Guru Dalam Menghadapi Anak Berkebutuhan Khusus Attention Deficit Hyperactivity Disorder Di Sekolah Dasar." *Jurnal Pendidikan Inklusi Citra Bakti* 1(2):159–66. doi: 10.38048/jpicb.v1i2.2409.
- Pontifex, Matthew B., Brian J. Saliba, Lauren B. Raine, Daniel L. Picchietti, and Charles H. Hillman. 2013. "Exercise Improves Behavioral, Neurocognitive, and Scholastic Performance in Children with Attention-Deficit/Hyperactivity Disorder." *The Journal of Pediatrics* 162(3):543–51. doi: 10.1016/j.jpeds.2012.08.036.
- Prasetyo, T., and H. D. Dasnim. 2022. "Pembelajaran Daring Pada Siswa Attention Deficit Hyperactivity Disorder (ADHD) Di Sekolah Dasar." *El Midad* 14(1):52–69. doi: 10.20414/elmidad.v14i1.5159.
- da Silva, M. D. G. T., C. J. D. N. Araújo Maia, C. D. C. Fernandes Curvelo, L. T. D. S. Garcia, and L. M. G. Gonçalves. 2025. "Educational Robotics as a Pedagogical Resource for K-12 Students with Learning Difficulties." *Scientific Reports* 15(1):35923.
- Tavlin, S., M. Ariol, and G. M. Lawson. 2025. "Strengthening Relationships with Students with ADHD Symptomology: A Qualitative Study about Teacher Perspectives." *Teaching and Teacher Education* 153:104820. doi: 10.1016/j.tate.2024.104820.