JOURNAL OF INNOVATION AND RESEARCH IN PRIMARY EDUCATION | ISSN 2829-775X
Vol. 5, No. 1, 2026, 394-403
https://doi.org/10.56916/jirpe.v5i1.2789

Problem-Based Learning with Environmental Integration: An Action Research Study on Fifth-Grade Indonesian Language Achievement

Miftahul Hidayati
Department of Primary Teacher Education, Tadulako University, Palu, Indonesia

Rizal
Department of Primary Teacher Education, Tadulako University, Palu, Indonesia

Muhammad Aqil
Department of Primary Teacher Education, Tadulako University, Palu, Indonesia

Kadek Hariana
Department of Primary Teacher Education, Tadulako University, Palu, Indonesia

Muhammad Fasli
Department of Primary Teacher Education, Tadulako University, Palu, Indonesia

Surahman Wilade
Department of Primary Teacher Education, Tadulako University, Palu, Indonesia

***Corresponding Author:** hidayatim37@gmail.com

Keywords
problem-based learning
environment-based education
Indonesian language instruction
rural elementary schools
classroom action research

Article History
Received 2025-11-04
Accepted 2026-01-10

Abstract
Student learning outcomes in Indonesian language subjects remain suboptimal in rural elementary schools, necessitating pedagogical innovations that leverage locally available resources. This study examined the effectiveness of implementing a Problem-Based Learning (PBL) model assisted by environmental resources in improving Indonesian language learning outcomes among fifth-grade students. This classroom action research employed the Kemmis and McTaggart spiral model across two cycles at SDN 3 Sirenja, involving nine fifth-grade students. Data were collected through structured observation protocols documenting teacher and student activities, field notes, and criterion-referenced achievement tests. Quantitative data were analyzed using descriptive statistics to determine individual absorption rates and classical learning mastery, while qualitative data underwent thematic analysis following Miles, Huberman, and Saldaña's framework. Classical learning completeness increased dramatically from 11.11% at baseline to 88.88% in Cycle II, exceeding the institutional standard of 80%. Classical absorption rates improved from 32.22% to 80%, while teacher activity increased from 80.64% to 87.17% and student activity rose from 71.42% to 87.90%, indicating transformed classroom dynamics. The findings demonstrate that environment-assisted PBL significantly enhances Indonesian language learning in rural contexts by transforming passive instruction into active, student-centered learning. This approach offers a sustainable pedagogical model for resource-constrained schools, leveraging local environmental resources rather than requiring expensive materials or technology infrastructure.

INTRODUCTION

The quality of education in Indonesia has been a central concern in national development, particularly in enhancing the effectiveness of teaching and learning processes in elementary schools. Indonesian language instruction, as a foundational subject in the primary education curriculum, plays a crucial role in developing students' linguistic competence, critical thinking abilities, and communication skills (Salam et al., 2022). However, despite numerous educational reforms and curriculum innovations, student learning outcomes in Indonesian language subjects remain suboptimal, particularly in rural educational settings where traditional teacher-centered pedagogical approaches continue to

predominate (Nurliyanti et al., 2022; Laila, 2023). This persistent challenge necessitates a critical examination of instructional methodologies and the exploration of alternative pedagogical frameworks that can more effectively engage students and enhance their academic achievement.

Contemporary educational discourse emphasizes the importance of student-centered learning approaches that actively involve learners in constructing knowledge through meaningful interactions with their environment (Bada & Olusegun, 2015; Krahenbuhl, 2016). Constructivist theory posits that learners actively build knowledge by connecting new information to their prior experiences and existing understanding, shifting education from passive reception to active meaning-making (Tomljenovic & Tatalovic Vorkapic, 2020). The curriculum at the education unit level (KTSP) explicitly positions teachers as facilitators, motivators, and evaluators rather than mere transmitters of knowledge, underscoring the need for pedagogical strategies that foster student autonomy and active participation (Muslich, 2020). Nevertheless, classroom observations reveal a significant gap between curricular intentions and instructional practices. Many teachers continue to employ conventional lecture-based methods that fail to accommodate individual learning differences and do not connect academic content with students' lived experiences (Sumiati & Asra, 2020). This pedagogical disconnect results in students perceiving learning as an unpleasant obligation rather than an engaging intellectual pursuit, consequently leading to diminished motivation and poor academic performance (Skinner & Pitzer, 2012).

Problem-Based Learning (PBL) has emerged as a promising pedagogical innovation that addresses these instructional challenges by situating learning within authentic, real-world contexts. The theoretical foundations of PBL, which emphasize active inquiry, collaborative problem-solving, and the application of knowledge to practical situations, align well with constructivist principles of learning (Rusman, 2020; Strobel & van Barneveld, 2009). Research in various educational contexts has demonstrated that PBL can effectively enhance students' critical thinking skills, self-directed learning abilities, and deep conceptual understanding (Hariyanto, 2020; Reed et al., 2021). Specifically, PBL in elementary schools promotes development in critical thinking, creativity, communication, collaboration, and citizenship—the essential 21st-century competencies (Reed et al., 2021). Meta-analytic evidence suggests that when properly implemented, PBL produces superior learning outcomes compared to conventional classroom approaches, particularly in fostering higher-order thinking skills and long-term knowledge retention (Kwon et al., 2021; Sutika et al., 2023). However, most existing studies on PBL implementation have been conducted in urban schools with adequate resources and infrastructure (Reed et al., 2021), leaving a notable knowledge gap regarding its effectiveness in rural elementary school contexts where environmental and resource constraints differ significantly (Nurliyanti et al., 2022; Laila, 2023).

Furthermore, while the integration of local environmental contexts into PBL has been theoretically advocated by educators, empirical evidence examining how environmental resources can be systematically incorporated to support problem-based instruction in Indonesian language subjects remains limited. Place-based and environment-based education, which utilizes the surrounding environment as an integrating context for learning, has demonstrated significant potential for increasing academic achievement, student engagement, and motivation across multiple subject areas (NEETF, 2000). Research indicates that outdoor and environment-based learning experiences can enhance not only science learning but also reading, writing, mathematics, and social studies performance in elementary students (Kern, 2022). Nature-specific outdoor learning has been shown to develop students' social and teamwork skills, enhance wellbeing and concentration, and facilitate deeper environmental awareness while maintaining or improving academic outcomes compared to traditional indoor instruction (Dickson & Gray, 2022). The surrounding environment offers rich, accessible, and culturally relevant learning materials that can make abstract linguistic concepts more concrete and meaningful for elementary students (Dananjaya, 2019). Yet few studies have specifically investigated the synergistic effects of combining PBL with environmental resources in enhancing Indonesian language learning outcomes, particularly in addressing the unique challenges faced by students in rural schools where formal learning resources may be scarce but environmental learning opportunities are abundant.

The persistent low achievement in Indonesian language subjects at rural elementary schools exemplifies these broader educational challenges. In Indonesian rural contexts, teachers face multiple obstacles including inadequate infrastructure, limited teaching materials, language barriers stemming from local language dominance, and insufficient professional development opportunities (Nurliyanti et al., 2022; Laila, 2023). Research specifically addressing Indonesian language instruction at the elementary level highlights persistent barriers such as teacher competency gaps, inadequate alignment between teaching materials and student characteristics, and the multilingual classroom environment where students often use regional languages as their primary communication mode (Ramadhan et al., 2019). Preliminary observations at SDN 3 Sirenja indicated that students frequently exhibited passive learning behaviors, limited engagement with instructional content, and difficulty applying linguistic concepts to practical communication contexts. Teachers' reliance on conventional teaching methods that emphasized rote memorization rather than meaningful language use contributed to these unsatisfactory outcomes. This situation calls for an evidence-based intervention that not only transforms pedagogical practices but also leverages the readily available environmental resources to create more engaging and contextually relevant learning experiences.

This classroom action research addresses these identified gaps by investigating the effectiveness of implementing a Problem-Based Learning model assisted by environmental resources in improving Indonesian language learning outcomes among fifth-grade students at SDN 3 Sirenja. Specifically, this study aims to examine how the systematic integration of PBL pedagogy with local environmental contexts can enhance teacher instructional quality, increase student engagement and activity, and ultimately improve student achievement in Indonesian language subjects. By documenting the implementation process through two action research cycles, identifying effective practices and challenges encountered, and measuring learning outcomes using multiple indicators including classical mastery and absorption rates, this study contributes empirical evidence to the growing body of knowledge on contextually appropriate pedagogical innovations for rural elementary education. The findings have potential significance not only for improving instructional practices at the research site but also for informing broader educational policy and practice regarding the adaptation of innovative teaching methodologies to resource-constrained educational settings in Indonesia, while contributing to the international discourse on effective integration of place-based education and problem-based learning in multilingual, under-resourced school contexts.

METHODS

This study employed a classroom action research (CAR) design, a systematic and collaborative approach to investigating specific pedagogical challenges and implementing targeted interventions to improve educational practices (Kemmis & McTaggart, 1988). Classroom action research represents a cyclical process in which practitioners systematically examine their own instructional contexts, develop evidence-based solutions, and evaluate outcomes through iterative cycles of reflection and refinement (Coats, 2005). The research adopted the spiral model proposed by Kemmis and McTaggart (1988), which conceptualizes action research as a dynamic progression through four interconnected phases: planning, action implementation, observation, and reflection. This methodological framework was particularly appropriate for addressing the study's objectives, as it enabled the researchers to systematically document instructional improvements while maintaining the flexibility to adapt interventions based on emerging findings from each cycle. The study was conducted over two complete cycles, with each cycle comprising one instructional session, allowing for comprehensive assessment of the Problem-Based Learning model's effectiveness when integrated with environmental resources.

The research was conducted at SDN 3 Sirenja, a rural elementary school, during the 2024-2025 academic year. The study population consisted of all fifth-grade students enrolled in the school, with a total sample of nine students participating in the investigation (five males and four females). The selection of this grade level was intentional, as fifth-grade students have developed sufficient cognitive maturity to engage meaningfully with problem-based learning activities while still benefiting from

concrete, environment-based instructional supports (Reed et al., 2021). The relatively small class size, while presenting limitations for generalizability, facilitated intensive observation of individual student behaviors and enabled detailed documentation of learning processes throughout the intervention, consistent with the naturalistic inquiry characteristic of action research methodologies (Mills, 2011).

Data collection employed multiple instruments to ensure comprehensive triangulation of findings, a critical component of establishing trustworthiness in qualitative research (Creswell & Poth, 2018). Structured observation protocols were developed to systematically document both teacher and student activities during instructional sessions, capturing the frequency and quality of behaviors aligned with problem-based learning principles and environmental engagement. These observation instruments were designed following established guidelines for classroom observation tools, incorporating clearly defined behavioral indicators and rating scales to enhance inter-rater reliability (Smolkowski & Gunn, 2012). Field notes supplemented the structured observations by capturing contextual details, unexpected occurrences, and qualitative nuances of classroom interactions that might not be captured through standardized protocols alone. Student learning outcomes were assessed through criterion-referenced achievement tests administered at the conclusion of each cycle, designed to measure comprehension and application of Indonesian language competencies addressed during instruction. The validity of the achievement tests was established through alignment with curriculum standards and learning objectives, while reliability was ensured through consistent administration procedures and clear scoring rubrics. Additionally, a preliminary assessment was conducted prior to the intervention to establish baseline performance levels and identify specific learning difficulties requiring targeted instructional attention.

Quantitative data from student achievement tests were analyzed using descriptive statistics to determine individual absorption rates and classical learning mastery. Individual absorption was calculated by dividing each student's score by the maximum possible score and expressing the result as a percentage, with students achieving 70% or higher classified as having attained individual mastery. Classical learning completeness was determined by calculating the percentage of students who achieved individual mastery, with a threshold of 80% established as the criterion for successful classroom-level achievement, consistent with the minimum mastery standards (KKM) specified by the school. Qualitative data from observations and field notes were analyzed using thematic analysis procedures adapted from Miles, Huberman, and Saldaña's (2014) framework for qualitative data analysis, which emphasizes systematic data condensation, display, and conclusion drawing. This analytical process involved three concurrent activities: data reduction, through which extensive observation records were synthesized into meaningful patterns; data display, utilizing matrices and descriptive summaries to organize information systematically; and conclusion drawing and verification, wherein patterns were interpreted and validated through triangulation across multiple data sources. The success criteria for this action research were operationally defined as achieving a minimum individual absorption rate of 65% and classical learning completeness of at least 80%, benchmarks established in accordance with the school's curriculum standards and deemed appropriate for rural elementary school contexts where resource constraints may influence achievement levels.

RESULTS AND DISCUSSION

Results

Pre-Action Assessment

Prior to implementing the Problem-Based Learning (PBL) intervention, a pre-action assessment was conducted on August 19, 2025, to establish baseline performance levels among the nine fifth-grade students at SDN 3 Sirenja. The initial test results revealed substantial learning challenges within the classroom. As presented in Table 1, the highest score achieved was 80, while the lowest was 10, indicating considerable performance variability among students. Alarmingly, only one student (11.11%) achieved the minimum mastery criterion, while eight students (88.89%) failed to meet this threshold. The classical absorption rate—representing the overall comprehension level across the class—stood at merely 32.22%, significantly below the school's established standard of 80%. These

baseline findings underscore the urgent need for pedagogical intervention, as the existing instructional approaches were demonstrably insufficient in supporting student learning outcomes in Indonesian language subjects.

Table 1. Pre-Action Test Results

No	Aspect	Result
1	Highest Score	80
2	Lowest Score	10
3	Number of Students	9
4	Students Who Achieved Mastery	1
5	Students Who Did Not Achieve Mastery	8
6	Classical Absorption Rate	32.22%
7	Classical Learning Completeness	11.11%

Cycle I Implementation and Outcomes

The first cycle of the action research introduced the Problem-Based Learning model integrated with environmental resources during a single instructional session. This initial implementation aimed to transform the traditional teacher-centered pedagogy into a more student-centered approach that leveraged local environmental contexts to make Indonesian language learning more concrete and meaningful. Following the intervention, students completed an end-of-cycle assessment to measure learning outcomes. As detailed in Table 2, the highest score improved to 90, though the lowest score was 40, indicating persistent achievement gaps. Of the nine participants, two students (22.22%) achieved mastery while seven (77.78%) remained below the threshold. The classical absorption rate increased to 60%, and classical learning completeness reached 22.22%—both representing improvements from baseline but still falling short of the 80% institutional standard. These results indicated that while the PBL intervention showed promise in enhancing learning outcomes, the initial implementation required substantial refinement to address identified weaknesses in both teacher facilitation and student engagement patterns.

Table 2. Cycle I Learning Outcomes

No	Aspect	Result
1	Highest Score	90
2	Lowest Score	40
3	Number of Students	9
4	Students Who Achieved Mastery	2
5	Students Who Did Not Achieve Mastery	7
6	Classical Absorption Rate	60%
7	Classical Learning Completeness	22.22%

Observation data from Cycle I revealed several critical areas requiring improvement. Teacher activity received a rating of 80.64%, categorized as "good" but indicating room for enhancement in instructional quality. Specifically, the teacher's questioning strategies remained limited and did not sufficiently explore students' experiential knowledge, while motivational techniques were too generic to effectively engage learners. Student activity was rated at 71.42%, reflecting uneven participation during collaborative work. Many students exhibited passive behaviors during group discussions, relying heavily on more vocal peers rather than contributing actively. Additionally, the group formation process consumed excessive instructional time, and students demonstrated difficulty synthesizing discussion outcomes into coherent presentations. These observational findings aligned with research demonstrating that successful PBL implementation requires explicit scaffolding of collaborative skills and careful attention to classroom organization (Reed et al., 2021).

Cycle II Implementation and Outcomes

Based on comprehensive reflection and analysis of Cycle I deficiencies, targeted modifications were implemented in Cycle II to address identified weaknesses systematically. The teacher enhanced questioning strategies by incorporating more contextual and diverse perceptual questions that

connected directly to students' lived experiences, thereby increasing cognitive engagement during preliminary activities. Motivational techniques were refined to include concrete examples and short narratives relevant to students' daily lives, making abstract linguistic concepts more accessible and personally meaningful. To address time management issues, student groups were organized before the lesson commenced, and worksheets were prepared in advance according to group configurations, allowing for more efficient transitions and maximizing productive learning time. The teacher also provided more intensive guidance during collaborative activities, explicitly assigning roles within groups (note-taker, spokesperson, questioner, presenter) to ensure equitable participation and discourage passive learning behaviors. Furthermore, explicit instruction in strategy development and perspective-taking was integrated to enhance the quality of group problem-solving processes.

These systematic improvements yielded substantial gains in student learning outcomes, as demonstrated in Table 3. The highest score reached 100, indicating that at least one student achieved complete mastery of the assessed competencies. Although the lowest score remained at 30—suggesting that one student continued to struggle significantly—eight of nine students (88.88%) achieved mastery, exceeding the institutional threshold of 80% classical completeness. The classical absorption rate reached 80%, precisely meeting the established standard. These quantitative improvements were complemented by qualitative enhancements in classroom dynamics: teacher activity increased to 87.17%, and student activity rose dramatically to 87.90%, both categorized in the "good" to "very good" range.

Table 3. Cycle II Learning Outcomes

No	Aspect	Result
1	Highest Score	100
2	Lowest Score	30
3	Number of Students	9
4	Students Who Achieved Mastery	8
5	Students Who Did Not Achieve Mastery	1
6	Classical Absorption Rate	80%
7	Classical Learning Completeness	88.88%

An unexpected finding emerged regarding the single student who continued to perform below mastery level. Despite substantial improvements in overall classroom engagement and instructional quality, this student's persistent difficulty suggests that individual learning differences may require additional differentiated support beyond whole-class PBL interventions. This observation aligns with research indicating that while PBL effectively promotes learning for most students, some learners may require supplementary scaffolding or alternative instructional approaches to achieve mastery (Strobel & van Barneveld, 2009). This finding opens an important perspective for future research on how PBL implementations can be differentiated to accommodate diverse learning needs more effectively within rural elementary contexts.

Discussion

The present study demonstrates that implementing a Problem-Based Learning model assisted by environmental resources significantly improved Indonesian language learning outcomes among fifth-grade students at SDN 3 Sirenja, thereby affirming the study's central hypothesis. The progression from 11.11% classical completeness at baseline to 88.88% following the refined intervention represents not merely a statistical improvement but a fundamental transformation in classroom learning dynamics. These findings resonate strongly with international research documenting PBL's effectiveness in elementary education contexts. Reed et al. (2021) demonstrated that well-implemented PBL promotes development across multiple competency domains—critical thinking, creativity, communication, collaboration, and citizenship—precisely the capacities observed in the enhanced student engagement documented in Cycle II of this study. Similarly, meta-analytic

evidence from Kwon et al. (2021) and Sutika et al. (2023) supports the conclusion that PBL, when properly structured, produces superior learning outcomes compared to conventional instructional approaches, particularly for higher-order cognitive skills.

The integration of environmental resources as contextual supports for PBL represents a particularly significant contribution of this research. The dramatic improvements between Cycle I and Cycle II underscore that PBL's effectiveness depends critically on how teachers orchestrate student interactions with both problems and environmental contexts. This finding extends previous research on environment-based education, which has demonstrated that outdoor and place-based learning can enhance not only environmental awareness but also core academic competencies across multiple subject areas (Becker et al., 2017; Dickson & Gray, 2022). Specifically, Dickson & Gray (2022f) ound that nature-specific outdoor learning develops social skills, enhances wellbeing and concentration, and facilitates environmental awareness while maintaining academic outcomes comparable to or exceeding traditional indoor instruction. The present study's results align with these findings while extending them to demonstrate that environmental integration can specifically support language learning—a domain less frequently examined in outdoor education research. Ernst and Stanek (2006) identified outdoor teaching's value for reading and writing performance, but few studies have specifically investigated how environmental contexts can scaffold problem-based approaches to language instruction in resource-constrained rural schools where formal learning materials are scarce but environmental learning opportunities abound.

The observational data revealing progressive improvements in teacher and student activity rates merit careful interpretation. The increase in teacher activity scores from 80.64% to 87.17% reflects growing instructional sophistication in facilitating PBL. Research on classroom observation and instructional quality consistently demonstrates that teacher effectiveness is not merely about content knowledge but about the quality of teacher-student interactions (Allen et al., 2013; Pianta & Hamre, 2009). The systematic enhancements made between cycles—more contextual questioning, targeted motivational strategies, efficient classroom organization, and explicit scaffolding of collaborative processes—represent precisely the types of emotional, organizational, and instructional supports that observation research identifies as critical for student achievement (Mashburn et al., 2010). Importantly, these improvements were achieved through the action research cycle itself, demonstrating that structured reflection and iterative refinement enable teachers to enhance their practice systematically. This finding has significant implications for professional development in rural contexts where access to formal training opportunities may be limited.

The substantial increase in student activity from 71.42% to 87.90% provides empirical support for PBL's theoretical promise of fostering active, student-centered learning. Research on student engagement consistently demonstrates its fundamental importance for academic achievement (Skinner & Pitzer, 2012). The present study's documentation of increased student participation, more balanced collaborative interactions, and enhanced ability to articulate learning outcomes aligns with broader findings that PBL creates conditions for authentic intellectual engagement rather than passive information reception. However, the persistent difficulty experienced by one student despite these systemic improvements illuminates an important limitation of whole-class interventions. This finding challenges the sometimes-implicit assumption in PBL advocacy that a single pedagogical approach will be universally effective and underscores the continuing importance of differentiated instruction even within student-centered frameworks (Tomljenovic & Tatalovic Vorkapic, 2020).

Theoretically, this study contributes empirical evidence supporting constructivist learning theory's applicability in rural Indonesian elementary contexts. The findings demonstrate that when students actively construct knowledge through problem-solving in meaningful environmental contexts, supported by appropriate scaffolding, they achieve deeper understanding than through passive reception of information (Bada & Olusegun, 2015). Practically, this research offers a viable model for improving instruction in resource-constrained rural schools. Unlike technology-intensive innovations requiring substantial infrastructure investment, environment-assisted PBL leverages readily available

local resources while requiring primarily pedagogical rather than material support. The action research framework proved effective for enabling teacher professional development through structured reflection and iterative refinement without requiring expensive external training programs—a particularly relevant finding for rural educational contexts where access to formal professional development is often limited.

Several limitations warrant acknowledgment. The small sample size (n=9) limits generalizability, though it facilitated intensive observation characteristic of action research methodologies. The study's two-cycle duration, while sufficient for demonstrating improvement, may not capture long-term sustainability or identify optimal intervention duration. The absence of a comparison group prevents definitive causal claims, though the within-subjects design across multiple cycles and triangulation across multiple data sources enhances confidence in attributing improvements to the intervention. Additionally, while the study documented outcomes in Indonesian language learning, it did not systematically assess transfer of problem-solving skills to other subject areas—an important direction for future research.

This classroom action research demonstrates that environment-assisted Problem-Based Learning represents a viable and effective pedagogical innovation for rural elementary Indonesian language instruction. The integration of systematic problem-based inquiry with contextually relevant environmental resources addresses both motivational and cognitive dimensions of learning, transforming passive classrooms into active learning communities where students engage meaningfully with authentic linguistic challenges. The progressive improvements across cycles underscore that PBL implementation requires careful attention to instructional scaffolding, classroom organization, and the quality of teacher-student and peer interactions. Most importantly, this study demonstrates that significant improvements in teaching and learning are achievable in rural contexts through structured reflective practice and leveraging of local environmental resources, offering hope for addressing persistent achievement gaps in under-resourced educational settings without requiring prohibitive infrastructure investments.

CONCLUSION

This classroom action research demonstrates that implementing a Problem-Based Learning model assisted by environmental resources significantly improves Indonesian language learning outcomes in rural elementary contexts. Through systematic intervention across two cycles, classical learning completeness increased from 11.11% at baseline to 88.88% in Cycle II, while classical absorption rates rose from 32.22% to 80%, exceeding the institutional standard. Concurrent improvements in teacher activity (80.64% to 87.17%) and student activity (71.42% to 87.90%) indicate that the intervention transformed classroom dynamics from passive, teacher-centered instruction to active, student-centered learning characterized by meaningful engagement with authentic linguistic challenges embedded in local environmental contexts.

This study contributes empirical evidence to the international discourse on contextually appropriate pedagogical innovations for resource-constrained educational settings. By demonstrating that locally available environmental resources can effectively support problem-based approaches to language instruction, the research offers a viable and sustainable model for rural schools lacking access to expensive learning materials or technology infrastructure. The findings underscore that significant improvements in teaching quality and learning outcomes are achievable through structured reflective practice and strategic leveraging of contextual resources, rather than requiring prohibitive material investments.

Several limitations warrant acknowledgment. The small sample size (n=9) and single-site design limit generalizability, while the two-cycle duration may not capture long-term sustainability. The absence of a comparison group and limited assessment of skill transfer to other domains represent additional constraints. Future research should examine PBL implementation across multiple rural sites with larger samples, investigate long-term retention effects, explore strategies for

differentiating instruction within PBL frameworks to support struggling learners more effectively, and assess whether problem-solving competencies developed through environment-assisted PBL transfer to other academic subjects. Additionally, research examining optimal professional development models for supporting rural teachers in implementing PBL would enhance scalability and sustainability of this pedagogical approach.

ACKNOWLEDGMENT

The authors express sincere gratitude to all individuals and institutions who contributed to the successful completion of this research. We extend particular appreciation to the administration and teaching staff of SDN 3 Sirenja for granting access to the research site and providing invaluable support throughout the data collection process. Special thanks are due to the fifth-grade students whose active participation and engagement made this study possible. We are deeply grateful to the faculty advisors and colleagues at the Department of Primary Teacher Education, Tadulako University, for their constructive feedback and scholarly guidance during various stages of this research. The authors also acknowledge the anonymous reviewers whose insightful comments significantly enhanced the quality of this manuscript. Finally, we thank our families for their unwavering support and encouragement throughout this research endeavor.

REFERENCES

Allen, J. P., Pianta, R. C., Gregory, A., Mikami, A. Y., & Lun, J. (2013). An interaction-based approach to enhancing secondary school instruction and student achievement. *Science*, *340*(6130), 1034–1037. https://doi.org/10.1126/science.1207998

Bada, S. O., & Olusegun, S. (2015). Constructivism learning theory: A paradigm for teaching and learning. *Journal of Research & Method in Education*, *5*(6), 66–70. https://doi.org/10.9790/7388-05616670

Becker, C., Lauterbach, G., Spengler, S., Dettweiler, U., & Mess, F. (2017). Effects of regular classes in outdoor education settings: A systematic review on students' learning, social and health dimensions. *International Journal of Environmental Research and Public Health*, *14*(5), Article 485. https://doi.org/10.3390/ijerph14050485

Coats, M. (2005). *Action research: A guide for associate lecturers*. Centre for Outcomes-Based Education.

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). SAGE Publications.

Dananjaya, U. (2019). *Active learning media*. Nuansa.

Dickson, T. J., & Gray, T. L. (2022). Nature-based solutions: Democratising the outdoors to be a vaccine and a salve for a neoliberal and COVID-19 impacted society. *Journal of Adventure Education and Outdoor Learning*, *22*(4), 278-297. https://doi.org/10.1080/14729679.2022.2064887

Ernst, J., & Stanek, D. (2006). The prairie science class: A model for re-visioning environmental education within the national wildlife refuge system. *Human Dimensions of Wildlife*, *11*(3), 155–168. https://doi.org/10.1080/10871200600803010

Hariyanto. (2020). *Learning models*. CV Wacana Prima.

Kemmis, S., & McTaggart, R. (1988). *The action research planner* (3rd ed.). Deakin University Press.

Kern, M. L. (2022). *Outdoor education guidebook*. Australian Council for Educational Research.

Krahenbuhl, K. S. (2016). Student-centered education and constructivism: Challenges, concerns, and clarity for teachers. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, *89*(3), 97–105. https://doi.org/10.1080/00098655.2016.1191311

Kwon, K., Hong, R. Y., & Laffey, J. M. (2021). The educational impact of metacognitive group coordination in computer-supported collaborative learning. *Computers in Human Behavior*, *52*, 319–331. https://doi.org/10.1016/j.chb.2013.01.003

Laila, M. (2023). Challenges in teaching English at rural schools in Indonesia. *Journal of English Language Education and Literature*, *8*(1), 45–58. https://doi.org/10.23887/jpiundiksha.v12i3.57804

Mashburn, A. J., Hamre, B. K., Downer, J. T., & Pianta, R. C. (2010). Teacher and classroom characteristics associated with teachers' ratings of prekindergartners' relationships and behaviors. *Journal of Psychoeducational Assessment*, *28*(4), 278–290. https://doi.org/10.1177/0734282906290594

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). SAGE Publications.

Mills, G. E. (2011). *Action research: A guide for the teacher researcher* (4th ed.). Pearson.

Muslich, M. (2020). *Implementing PTK is easy*. PT Bumi Aksara.

National Environmental Education & Training Foundation. (2000). *Environment-based education: Creating high performance schools and students*. Author.

Nurliyanti, N., Nadrun, N., & Maf'ulah, M. U. (2022). Teachers'pedagogical Competence In Teaching English At Junior High School. *e-Journal of ELTS (English Language Teaching Society)*, *10*(3), 244-258. https://doi.org/10.22487/elts.v10i3.3184

Pianta, R. C., & Hamre, B. K. (2009). Conceptualization, measurement, and improvement of classroom processes: Standardized observation can leverage capacity. *Educational Researcher*, *38*(2), 109–119. https://doi.org/10.3102/0013189X09332374

Ramadhan, S., Sukma, E., & Indriyani, V. (2019). Teacher competence in utilizing digital media literacy in education. In *Journal of Physics: Conference Series* (Vol. 1339, No. 1, p. 012111). IOP Publishing. https://doi.org/10.1088/1742-6596/1339/1/012111

Reed, S. S., Mullen, C. A., & Boyles, E. T. (2021). *Problem-Based Learning in Elementary School*. Springer International Publishing. https://doi.org/10.1007/978-3-030-70598-5

Rusman. (2020). *Learning model: Developing teacher professionalism*. PT Rajawali Press.

Salam, S., Firman, F., & Mirnawati, M. (2022). How to improve learning outcomes of the Indonesian language in elementary schools through the implementation of problem-based learning methods. *Pedagogik Journal of Islamic Elementary School*, 131-144. https://doi.org/10.24256/pijies.v5i1.2736

Skinner, E. A., & Pitzer, J. R. (2012). Developmental dynamics of student engagement, coping, and everyday resilience. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 21–44). Springer. https://doi.org/10.1007/978-1-4614-2018-7_2

Smolkowski, K., & Gunn, B. (2012). Reliability and validity of the classroom observations of student-teacher interactions (COSTI) for kindergarten reading instruction. *Early Childhood Research Quarterly*, *27*(2), 316–328. https://doi.org/10.1016/j.ecresq.2011.09.004

Strobel, J., & van Barneveld, A. (2009). When is PBL more effective? A meta-synthesis of meta-analyses comparing PBL to conventional classrooms. *Interdisciplinary Journal of Problem-Based Learning*, *3*(1), 44–58. https://doi.org/10.7771/1541-5015.1046

Sumiati, & Asra. (2020). *Learning methods*. CV Wacana Prima.

Sutika, I. M., Ardana, I. M., & Divayana, D. G. H. (2023). The effect of problem-based learning model on higher order thinking skills in elementary school students. *Journal of Education Technology*, *7*(1), 134–143. https://doi.org/10.23887/jpp.v55i3.57636

Tomljenović, Z., & Vorkapić, S. T. (2020). Constructivism in visual arts classes. *Center for Educational Policy Studies Journal*, *10*(4), 13-32. https://doi.org/10.26529/cepsj.913