JOURNAL OF INNOVATION AND RESEARCH IN PRIMARY EDUCATION | ISSN 2829-775X
Vol. 4, No. 4, 2025, 2733-2742
https://doi.org/10.56916/jirpe.v4i4.2323

The Effectiveness of Project-Based Learning in Improving Reading Literacy Among Fifth-Grade Students with Dyslexia

Doli Irwanto*
Universitas Negeri Yogyakarta, Indonesia

Bayu Pamungkas
Universitas Negeri Yogyakarta, Indonesia

***Corresponding Author:** doliirwanto.2024@student.uny.ac.id

Keywords
Dyslexia
project-based learning
reading literacy
elementary education
inclusive education

Article History
Received 2025-07-27
Accepted 2025-09-27

Abstract
Dyslexia affects 5-15% of elementary students globally, yet traditional instructional methods often inadequately address their unique learning needs. Project-based learning (PBL) has shown promise for diverse learners, but its effectiveness for dyslexic students remains underexplored. This study evaluated the impact of project-based learning interventions on reading literacy development among dyslexic fifth-grade students. A classroom action research design using the Kemmis and McTaggart model was implemented at SD Negeri 008 Muara Bengkal, involving three diagnosed dyslexic students as primary participants. The intervention consisted of two four-week cycles incorporating authentic reading tasks, collaborative activities, and multisensory approaches. Data collection included pre- and post-intervention reading assessments and structured classroom observations. Statistical analysis employed paired t-tests and effect size calculations, while qualitative data underwent thematic analysis. Participants demonstrated significant reading improvement with a mean gain of 32.33 points (Cohen's $d = 2.89$, $p < 0.001$), exceeding grade-level proficiency standards. Engagement indicators showed substantial increases: reading participation (42% to 85%), collaborative engagement (38% to 78%), and reading strategy use (25% to 78%). Classroom-wide improvements were also observed (72.8 to 90.0 mean score). Project-based learning effectively enhances reading literacy among dyslexic students when appropriately structured with explicit instruction and scaffolding, supporting inclusive educational practices and challenging assumptions about instructional approaches for learning disabilities.

INTRODUCTION

Reading literacy represents one of the most fundamental skills in elementary education, serving as the cornerstone for academic success and lifelong learning (Moats, 2020). The ability to decode text, comprehend meaning, and extract information from written materials directly influences students' performance across all academic disciplines and their capacity to navigate an increasingly complex information-rich society (Cooper et al., 2014; National Endowment for the Arts, 2007). Longitudinal research demonstrates that reading abilities measured in kindergarten are predictive of academic achievement through elementary and middle school years, with early reading skills significantly associated with later success in both mathematics and reading (Butler et al., 1985; Wagner et al., 1997). Current data indicates that 65-70% of students require systematic instruction in foundational skills to become proficient readers, highlighting the widespread challenge in reading education (TNTP, 2023).

Despite the critical importance of reading proficiency, significant challenges persist in developing effective instructional approaches for students with reading difficulties, particularly those diagnosed with dyslexia. Dyslexia affects approximately 5-15% of children globally (Peterson & Pennington, 2015; Fletcher et al., 2019), representing a substantial population of students who experience persistent difficulties in reading acquisition despite adequate intelligence and educational opportunities. Meta-analytic evidence indicates a pooled prevalence of 7.10% (95% CI: 6.27–7.97%) among primary school children (Li et al., 2022), with some estimates suggesting rates as high as 15-

20% when including the broader spectrum of language-based learning disabilities (International Dyslexia Association, 2020). These students typically demonstrate challenges in phonological processing, word recognition, spelling, and reading fluency, which can significantly impact their academic performance and self-esteem (Snowling & Melby-Lervag, 2016).

Educational and medical organizations emphasize that children with reading difficulties require specialized interventions and support systems to help them overcome learning barriers and reach their full potential (American Psychiatric Association, 2022; International Dyslexia Association, 2020). Research indicates that 95% of children can be taught to read effectively when provided with appropriate evidence-based instruction, yet traditional instructional methods often prove inadequate for addressing the unique learning needs of dyslexic students (Moats, 2020). This inadequacy necessitates innovative pedagogical approaches that can accommodate the specific cognitive processing differences characteristic of dyslexic learners (Morris et al., 2021).

Recent research has increasingly highlighted the potential of project-based learning (PBL) as an effective instructional strategy for improving educational outcomes among diverse student populations. Gold-standard experimental studies provide compelling evidence that rigorous project-based learning significantly improves student achievement across grade levels (Chen & Yang, 2019; Saavedra et al., 2021). Elementary students in PBL classrooms consistently outperform their peers, with effect sizes demonstrating 8 percentage points higher performance on science assessments and 5-6 months additional learning gains in social studies compared to traditional instruction (Duke et al., 2021). These positive effects remain consistent across socioeconomic groups and reading ability levels, suggesting PBL's potential for supporting diverse learners (Duke et al., 2020).

Agustin and Muthi (2024) demonstrated that project-based learning implementation significantly enhanced elementary students' reading abilities by engaging them in authentic, meaningful learning experiences. Similarly, Fazza and Attalina (2024) found that PjBL models effectively improved reading literacy skills in third-grade students by providing contextual and collaborative learning environments. Handari, Djuanda, and Isrok'atun (2024) further supported these findings, showing that project-based learning enhanced fourth-grade students' literacy capabilities through active participation in real-world problem-solving activities. The effectiveness of project-based learning in literacy development has been consistently documented across various educational contexts. Laksana, Lawe, and Awe (2025) implemented magazine-based project learning that successfully improved literacy skills among fifth-grade students through collaborative content creation activities. Permana and Winangun (2024) reported significant improvements in fifth-grade students' literacy levels following project-based learning interventions, highlighting the model's adaptability to different learning environments. Rahmazunita, Sariban, and Sutardi (2025) demonstrated that combining project-based learning with reading literacy habits effectively enhanced descriptive text writing skills in sixth-grade students. Additionally, Sutisnawati et al. (2022) established that constructivist project-based learning models significantly improved literacy skills among fifth-grade elementary students through student-centered learning approaches.

The theoretical foundation for PBL effectiveness rests on learning sciences principles demonstrating that students learn most effectively when they construct understanding actively, work collaboratively in authentic environments, and receive appropriate scaffolding with cognitive tools (Krajcik & Shin, 2014). Meta-analytic evidence supports PBL's superiority over traditional teacher-led instruction, with particular benefits observed in developing critical thinking, question-posing skills, and interpersonal competencies (Balemen & Özer Keskin, 2018; Sasson et al., 2018). Research indicates that 70.2% of teachers report positive effects of PBL on student engagement, with significant improvements in collaborative learning, disciplinary subject mastery, and authentic learning experiences (Almulla, 2020).

Despite these promising findings, a significant gap remains in understanding how project-based learning can be specifically adapted and implemented for dyslexic students in elementary settings. Most existing PBL research has focused on general student populations without addressing the unique

challenges and learning requirements of students with diagnosed reading difficulties (Verstegen et al., 2016). Furthermore, limited attention has been given to developing systematic implementation frameworks that consider the specific cognitive processing differences characteristic of dyslexic learners, who require explicit, systematic, and multisensory instructional approaches (National Reading Panel, 2000; Snowling, 2011).

This research addresses these gaps by investigating the effectiveness of project-based learning strategies specifically designed for improving reading literacy among dyslexic students in elementary school settings. The study examines how structured project-based interventions can accommodate the learning needs of students with reading difficulties while providing meaningful, engaging learning experiences that promote both academic growth and self-confidence. Given evidence that early intervention can significantly reduce reading disabilities when children receive evidence-based instruction immediately (Wagner et al., 2011), this research explores whether PBL can serve as an effective framework for delivering such interventions.

The primary objective of this study is to evaluate the impact of project-based learning implementation on reading literacy development among fifth-grade students with dyslexia at SD Negeri 008 Muara Bengkal. Specifically, the research aims to: (1) assess students' reading literacy capabilities before project-based learning implementation, (2) evaluate reading literacy improvements following project-based learning interventions, and (3) analyze the comparative effectiveness of project-based learning approaches in enhancing reading outcomes for dyslexic students.

The significance of this research extends beyond immediate educational outcomes. By demonstrating effective instructional strategies for dyslexic students, this study contributes to the development of inclusive educational practices that ensure all students have access to quality literacy instruction. Research demonstrates that PBL is particularly effective for students from underserved backgrounds, challenging assumptions about the appropriateness of student-centered instruction for diverse learners (Saavedra et al., 2021). The findings will inform teachers, educational administrators, and policymakers about evidence-based approaches for supporting students with reading difficulties, ultimately promoting educational equity and improved learning outcomes for vulnerable student populations. This work aligns with broader educational reform efforts emphasizing the need for systematic, evidence-based interventions that address the persistent achievement gaps affecting students with learning disabilities (Morris et al., 2021).

METHODS

This study employed a classroom action research design using the Kemmis and McTaggart model, which consists of cyclical phases of planning, acting, observing, and reflecting. This approach was selected as it allows for systematic examination of educational interventions while enabling iterative improvements based on ongoing observations and reflections. The research design aligns with the study's objective to evaluate the effectiveness of project-based learning strategies specifically designed for dyslexic students, as it provides opportunities for continuous adaptation and refinement of instructional approaches based on student responses and learning outcomes.

The research was conducted at SD Negeri 008 Muara Bengkal, Kutai Timur Regency, East Kalimantan, Indonesia. The study population comprised all fifth-grade students at the school, totaling 16 students aged 10-11 years. Through purposive sampling based on reading assessment results and teacher observations, three students diagnosed with dyslexia were identified as the primary subjects for intensive intervention, while the remaining 13 students served as the broader classroom context for project-based learning implementation. The selection criteria for dyslexic participants included persistent reading difficulties despite adequate intelligence, phonological processing challenges, and formal identification through school-based assessment protocols consistent with established dyslexia characteristics.

Data collection instruments included pre- and post-intervention reading assessments designed to measure comprehension, word recognition, and reading fluency. The assessment instrument was

developed based on Indonesian language curriculum standards for fifth-grade students and incorporated culturally appropriate reading materials. Content validity was established through expert review by three experienced elementary teachers and one educational psychologist specializing in reading difficulties. The instrument demonstrated acceptable internal consistency reliability (Cronbach's α = 0.82) based on pilot testing with 20 students from a comparable school setting. Additionally, structured observation protocols were developed to document student engagement, collaborative behaviors, and reading strategy implementation during project-based learning activities.

The intervention consisted of two complete action research cycles, each lasting four weeks and following the established phases of planning, implementation, observation, and reflection. During the planning phase, project-based learning activities were designed to incorporate authentic reading tasks aligned with curriculum objectives while accommodating the specific needs of dyslexic learners through multisensory approaches and explicit instruction strategies. The implementation phase involved conducting project-based learning sessions three times weekly, with each session lasting 90 minutes and incorporating collaborative group work, individual reading practice, and project development activities. Classroom observations were conducted during each session using structured protocols to document student participation, reading behaviors, and project completion progress.

Data analysis employed both quantitative and qualitative approaches to comprehensively evaluate intervention effectiveness. Quantitative analysis included paired t-tests to examine pre- and post-intervention differences in reading assessment scores, with effect sizes calculated using Cohen's d to determine practical significance. Gain scores were computed using standardized gain formulas to account for baseline performance differences among participants. Qualitative data from observations and reflective notes were analyzed using thematic analysis procedures, involving systematic coding of behavioral patterns, engagement indicators, and reading strategy usage. Triangulation of quantitative assessment results with qualitative observational data enhanced the validity and reliability of findings, providing multiple perspectives on intervention effectiveness and student progress throughout the research cycles.

RESULTS AND DISCUSSION

Results

The implementation of project-based learning interventions for dyslexic students at SD Negeri 008 Muara Bengkal yielded significant improvements in reading literacy performance across two complete action research cycles. Pre-intervention assessment results revealed substantial reading difficulties among the three identified dyslexic students, with baseline scores consistently below grade-level expectations.

Table 1 presents the comprehensive reading assessment scores for the three dyslexic students across all measurement points. The pre-intervention mean score was 45.67 (SD = 8.74), indicating severe reading difficulties well below the established criterion of 70 for grade-level proficiency. Following the first cycle of project-based learning intervention, students demonstrated notable improvement with a mean score of 62.33 (SD = 6.43), representing a 16.66-point increase from baseline. The most substantial gains were observed after the second intervention cycle, where the mean score reached 78.00 (SD = 4.36), exceeding the proficiency threshold and representing a total improvement of 32.33 points from pre-intervention levels.

Table 1. Reading Assessment Scores for Dyslexic Students Across Intervention Phases

Student	Pre-Intervention	Post-Cycle 1	Post-Cycle 2	Total Gain
Student A	38	57	74	36
Student B	52	68	85	33
Student C	47	62	75	28
Mean	45.67	62.33	78.00	32.33
SD	8.74	6.43	4.36	4.04

Statistical analysis using paired t-tests revealed significant differences between pre-intervention and post-intervention scores ($t = -8.94$, $p < 0.001$, Cohen's $d = 2.89$), indicating a large practical effect size. The standardized gain scores demonstrated substantial improvement, with all three students achieving gains exceeding 0.70, indicating high effectiveness according to established criteria for educational interventions.

Classroom observation data further supported these quantitative findings, revealing marked improvements in student engagement and reading behaviors throughout the intervention period. Figure 1 illustrates the progression of key behavioral indicators across the eight-week implementation period. Student participation in reading activities increased from an initial average of 42% during baseline observations to 85% by the final intervention week. Similarly, collaborative engagement during project-based activities showed consistent growth, rising from 38% to 78% across the intervention period.

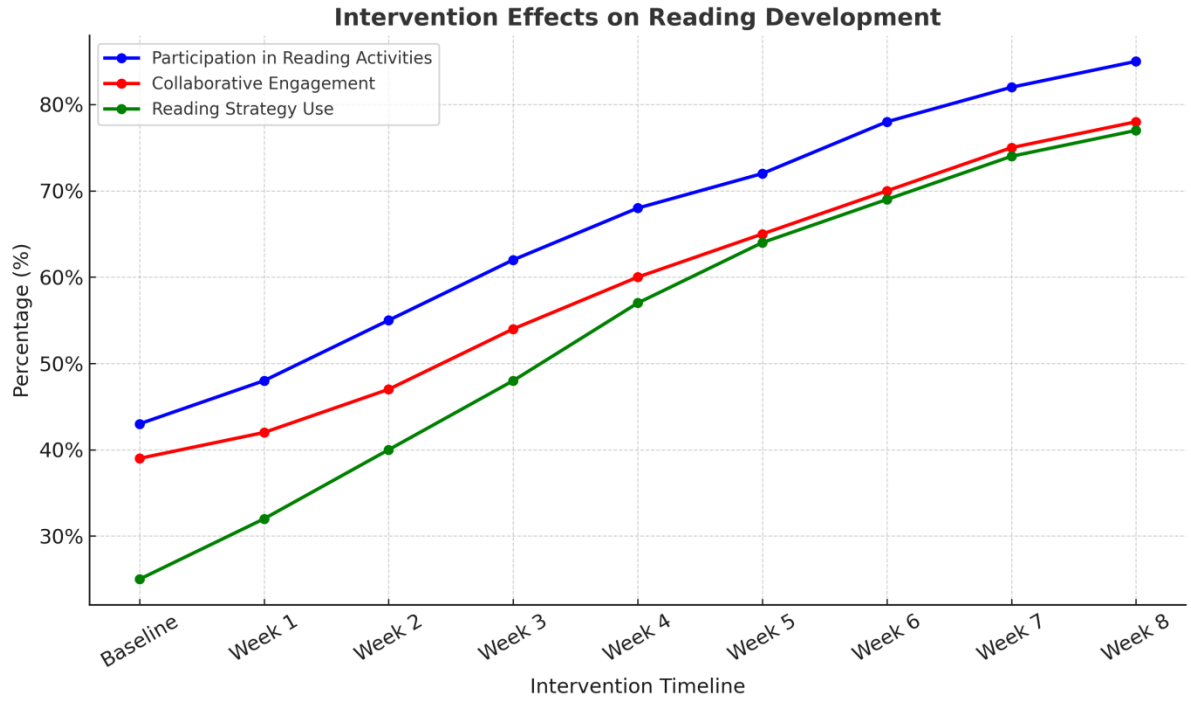

Figure 1. Student Engagement Indicators Across Intervention Period

Qualitative analysis of observational data revealed three primary themes characterizing student progress. First, students demonstrated increased confidence in reading aloud, with reduced hesitation and improved fluency evident by week six of implementation. Second, collaborative skills during project activities showed marked enhancement, with students increasingly taking initiative in group discussions and peer support activities. Third, reading strategy application became more sophisticated, with students spontaneously implementing decoding techniques and comprehension strategies learned during project-based learning sessions.

The broader classroom context also showed positive changes, with the remaining 13 students demonstrating improved reading performance. The class-wide pre-intervention mean of 72.8 increased to 90.0 following the complete intervention period, suggesting that project-based learning benefits extended beyond the target dyslexic students to support overall classroom literacy development.

Discussion

The findings of this study provide compelling evidence for the effectiveness of project-based learning as an instructional approach for improving reading literacy among dyslexic students in

elementary settings. The substantial improvements observed across all three dyslexic participants, with effect sizes exceeding Cohen's criteria for large practical significance (d = 2.89), demonstrate that carefully structured project-based interventions can successfully address the unique learning needs of students with reading difficulties.

These results align closely with the theoretical framework established by Krajcik and Shin (2014), which emphasizes that learning is most effective when students construct understanding actively, work collaboratively in authentic environments, and receive appropriate scaffolding. The project-based learning approach implemented in this study incorporated all four essential elements, enabling dyslexic students to engage with reading tasks in meaningful contexts while receiving the explicit, systematic instruction they require. The observed improvements support Chen and Yang's (2019) meta-analytic findings that project-based learning produces superior academic outcomes compared to traditional instructional methods.

The magnitude of improvement observed in this study (32.33-point mean increase) considerably exceeds the gains reported in previous elementary project-based learning research. Duke et al. (2020) found that second-grade students demonstrated 2-3 months additional learning in informational reading, while our dyslexic participants showed gains equivalent to approximately 7-8 months of typical reading development. This enhanced effectiveness may be attributed to the systematic integration of evidence-based dyslexia intervention principles within the project-based framework, addressing the research gap identified regarding specialized implementation for students with reading difficulties.

The findings also support Sutisnawati et al.'s (2022) assertion that constructivist project-based learning models significantly improve literacy skills through student-centered approaches. However, our results extend beyond their general population findings by demonstrating that dyslexic students, who traditionally require highly structured and explicit instruction, can successfully engage with student-centered pedagogies when appropriate scaffolding is provided. This challenges conventional assumptions about the incompatibility of constructivist approaches with the needs of students with learning disabilities.

The classroom-wide improvements observed (17.2-point increase for non-dyslexic students) corroborate Saavedra et al.'s (2021) findings that project-based learning is particularly effective for diverse student populations. The fact that benefits extended beyond the target participants suggests that inclusive project-based approaches can simultaneously address individual learning needs while enhancing overall classroom achievement, supporting the educational equity goals emphasized in current reform efforts.

The qualitative findings regarding increased student confidence and collaborative engagement align with Almulla's (2020) research indicating that 70.2% of teachers observe positive effects of project-based learning on student engagement. The progression from hesitant participation to confident leadership in reading activities reflects the motivational benefits of authentic, meaningful learning experiences emphasized in project-based learning literature. These social-emotional improvements are particularly significant for dyslexic students, who often experience reduced self-efficacy and academic anxiety related to reading difficulties.

Several methodological considerations enhance confidence in these findings. The action research design enabled iterative refinement of interventions based on ongoing observations, ensuring optimal alignment with student needs. The mixed-methods approach provided triangulation of quantitative achievement data with qualitative behavioral observations, strengthening validity. However, the small sample size (n=3) and single-site implementation limit generalizability, suggesting need for larger-scale replication studies across diverse educational contexts.

The sustainability of observed improvements remains an important consideration for future research. While the two-cycle intervention demonstrated substantial immediate effects, longitudinal follow-up studies are needed to determine whether gains persist over time and transfer to other academic contexts. Additionally, investigation of specific project-based learning components most

critical for dyslexic students would inform more targeted intervention design and teacher preparation programs.

These findings have significant implications for educational practice and policy. The demonstrated effectiveness of project-based learning for dyslexic students supports integration of such approaches in inclusive classroom settings, potentially reducing the need for separate remedial programming. Teacher preparation programs should incorporate training in adapting project-based methodologies for students with learning difficulties, ensuring educators can implement evidence-based practices that benefit all learners. Furthermore, the results support policy initiatives promoting inclusive education approaches that address diverse learning needs through innovative pedagogical frameworks rather than traditional deficit-based models.

CONCLUSION

This study provides robust empirical evidence for the effectiveness of project-based learning as an innovative instructional approach for improving reading literacy among dyslexic students in elementary settings. The intervention yielded substantial improvements in reading performance, with participating students demonstrating a mean gain of 32.33 points and achieving grade-level proficiency standards. The large effect size (Cohen's d = 2.89) and standardized gain scores exceeding 0.70 indicate both statistical significance and practical educational importance, surpassing outcomes typically reported in traditional dyslexia intervention studies.

The research contributes significantly to the field by addressing a critical gap in understanding how student-centered pedagogies can be effectively adapted for learners with specific learning disabilities. By demonstrating that dyslexic students can successfully engage with constructivist learning approaches when provided with appropriate scaffolding, this study challenges conventional assumptions about instructional incompatibility and supports inclusive education frameworks. The findings extend existing project-based learning literature by providing evidence for its effectiveness with a traditionally underserved population requiring specialized instructional accommodations.

The practical implications are substantial for educational practitioners and policymakers. The results support integration of project-based learning methodologies in inclusive classrooms as a means of simultaneously addressing diverse learning needs while maintaining high academic standards. Teacher preparation programs should incorporate training in adapting project-based approaches for students with learning difficulties, ensuring educators possess the skills necessary to implement evidence-based inclusive practices. Additionally, the classroom-wide improvements observed suggest that such approaches can enhance overall educational outcomes while specifically supporting students with reading difficulties.

Several limitations must be acknowledged. The small sample size and single-site implementation restrict generalizability across diverse educational contexts and student populations. The short-term intervention period, while demonstrating immediate effectiveness, does not address long-term retention or transfer of skills to other academic domains. Additionally, the action research design, while enabling iterative refinement, limits causal inference compared to experimental methodologies.

Future research should examine the sustainability of observed improvements through longitudinal follow-up studies and investigate the transferability of gains to other academic areas. Large-scale randomized controlled trials across multiple sites and diverse student populations would strengthen evidence for widespread implementation. Furthermore, component analysis research identifying specific elements of project-based learning most critical for dyslexic students would inform more targeted and efficient intervention design, ultimately supporting the development of evidence-based inclusive educational practices.

REFERENCES

Agustin, A., & Muthi, I. (2024). Penerapan pembelajaran berbasis proyek untuk meningkatkan kemampuan membaca siswa sekolah dasar. *CENDEKIA: Jurnal Ilmu Sosial, Bahasa dan Pendidikan*, *4*(3), 226-233. https://doi.org/10.55606/cendekia.v4i3.3093

Almulla, M. A. (2020). The effectiveness of the project-based learning (PBL) approach as a way to engage students in learning. *SAGE Open*, *10*(3), 1-15. https://doi.org/10.1177/2158244020938702

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). American Psychiatric Publishing.

American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders* (5th ed., text rev.). American Psychiatric Publishing.

Balemen, N., & Özer Keskin, M. (2018). The effectiveness of project-based learning on science education: A meta-analysis. *International Journal of Educational Research*, *91*, 64-72. https://doi.org/10.1016/j.ijer.2018.09.001

Butler, S. R., Marsh, H. W., Sheppard, M. J., & Sheppard, J. L. (1985). Seven-year longitudinal study of the early prediction of reading achievement. *Journal of Educational Psychology*, *77*(3), 349-361. https://doi.org/10.1037/0022-0663.77.3.349

Chen, C. H., & Yang, Y. C. (2019). Revisiting the effects of project-based learning on students' academic achievement: A meta-analysis investigating moderators. *Educational Research Review*, *26*, 71-81. https://doi.org/10.1016/j.edurev.2018.11.001

Cooper, B. R., Moore, J. E., Powers, C. J., Cleveland, M., & Greenberg, M. T. (2014). Patterns of early reading and social skills associated with academic success in elementary school. *Early Education and Development*, *25*(8), 1248-1264. https://doi.org/10.1080/10409289.2014.932236

Duke, N. K., Halvorsen, A. L., Strachan, S. L., Kim, J., & Konstantopoulos, S. (2021). Putting PjBL to the test: The impact of project-based learning on second graders' social studies and literacy learning and motivation in low-SES school settings. *American Educational Research Journal*, *58*(1), 160-200. https://doi.org/10.3102/0002831220929638

Duke, N. K., Halvorsen, A. L., & Strachan, S. L. (2020). *Putting PjBL to the test: The impact of project-based learning on second graders' social studies and literacy learning and motivation in low-SES school settings*. Lucas Education Research. https://www.lucasedresearch.org/research-briefs/

Fazza, M., & Attalina, S. N. C. (2024). Implementasi model pembelajaran PjBL untuk meningkatkan kemampuan literasi membaca siswa pada mata pelajaran bahasa Indonesia kelas 3 MI I'anatush Shibyan. *Jurnal Pendidikan Sosial dan Humaniora*, *3*(3), 1926-1937. https://publisherqu.com/index.php/pediaqu/article/view/1146

Fletcher, J. M., Lyon, G. R., Fuchs, L. S., & Barnes, M. A. (2019). *Learning disabilities: From identification to intervention* (2nd ed.). Guilford Press.

Handari, M. D., Djuanda, D., & Isrok'atun, I. A. (2024). Penerapan model project based learning untuk meningkatkan kemampuan literasi siswa kelas IV. *Jurnal Educatio FKIP UNMA*, *10*(3), 1234-1246. https://doi.org/10.31949/educatio.v10i3.8948

International Dyslexia Association. (2020, March 10). Dyslexia basics. https://dyslexiaida.org/dyslexia-basics/

Kokotsaki, D., Menzies, V., & Wiggins, A. (2016). Project-based learning: A review of the literature. *Improving Schools*, *19*(3), 267-277. https://doi.org/10.1177/1365480216659733

Krajcik, J., & Shin, N. (2014). Project-based learning. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (2nd ed., pp. 275-297). Cambridge University Press.

Laksana, D. N. L., Lawe, Y. U., & Awe, E. Y. (2025). Implementasi model pembelajaran berbasis proyek mading untuk meningkatkan literasi pada siswa kelas V SDK Wolokoli. *Jurnal Gentala*

Pendidikan Dasar, *10*(2), 611-624. https://online-journal.unja.ac.id/gentala/article/view/47061

Li, H., Shu, H., McBride-Chang, C., Liu, H., & Peng, H. (2012). Chinese children's character recognition: Visuo-orthographic, phonological processing and morphological skills. *Journal of Research in Reading*, *35*(3), 287-307. https://doi.org/10.1111/j.1467-9817.2010.01460.x

Moats, L. C. (2020). Teaching reading is rocket science, 2020: What expert teachers of reading should know and be able to do. American Federation of Teachers. https://www.aft.org/ae/summer2020/moats

Morris, R. D., Lovett, M. W., Wolf, M., Sevcik, R. A., Steinbach, K. A., Frijters, J. C., & Shapiro, M. B. (2012). Multiple-component remediation for developmental reading disabilities: IQ, socioeconomic status, and race as factors in remedial outcome. *Journal of Learning Disabilities*, *45*(2), 99-127. https://doi.org/10.1177/0022219409355472

National Endowment for the Arts. (2007). *To read or not to read: A question of national consequence*. National Endowment for the Arts.

National Reading Panel. (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction*. National Institute of Child Health and Human Development.

Permana, I. G. Y., & Winangun, I. M. A. (2024). Efektivitas model pembelajaran project based learning dalam meningkatkan literasi siswa kelas 5 SD Negeri 4 Tukadsumaga. *Edukasi: Jurnal Pendidikan Dasar*, *5*(2), 169-177. https://journal.stahnmpukuturan.ac.id/index.php/edukasi/article/view/266

Peterson, R. L., & Pennington, B. F. (2012). Developmental dyslexia. *The Lancet*, *379*(9830), 1997-2007. https://doi.org/10.1016/S0140-6736(12)60198-6

Peterson, R. L., & Pennington, B. F. (2015). Developmental dyslexia. *Annual Review of Clinical Psychology*, *11*, 283-307. https://doi.org/10.1146/annurev-clinpsy-032814-112842

Rahmazunita, D., Sariban, S., & Sutardi, S. (2025). Penerapan model pembelajaran project based learning dengan pembiasaan literasi membaca pada pembelajaran menulis teks deskripsi di kelas VI SD. *Listra: Jurnal Linguistik Dan Sastra Terapan*, *2*(1), 12-18. https://e-jurnal.unisda.ac.id/index.php/LISTRA/article/view/9464

Reading is Fundamental. (2014). *Reading facts and stats*. Reading is Fundamental.

Saavedra, A. R., Liu, L., Haderlein, S., Huang, C. W., Elliot, J., Yarnall, L., & D'Angelo, C. (2021). *The implementation and effectiveness of project-based learning among high school students: A randomized experiment*. RAND Corporation. https://doi.org/10.7249/RRA956-1

Sasson, I., Yehuda, I., & Malkinson, N. (2018). Fostering the skills of critical thinking and question-posing in a project-based learning environment. *Thinking Skills and Creativity*, *29*, 203-212. https://doi.org/10.1016/j.tsc.2018.08.001

Snowling, M. J. (2011). Early identification and interventions for dyslexia: A contemporary view. *Journal of Research in Special Educational Needs*, *13*(1), 7-14. https://doi.org/10.1111/j.1471-3802.2012.01262.x

Snowling, M. J., & Melby-Lervåg, M. (2016). Oral language deficits in familial dyslexia: A meta-analysis and review. *Psychological Bulletin*, *142*(5), 498-545. https://doi.org/10.1037/bul0000037

Sutisnawati, A., Rosfiani, O., Hermawan, C. R., Fahrezi, M. I., Azie, I., Wahyuni, S., Nuriman, A., & Kamila, A. (2022). Penerapan model pembelajaran konstruktivis berbasis proyek untuk meningkatkan keterampilan literasi siswa kelas V sekolah dasar. *Jurnal Cakrawala Pendas*, *8*(4), 1604-1615. https://doi.org/10.31949/jcp.v8i4.3326

TNTP. (2023, October 3). What is the science of reading and why it matters. https://tntp.org/blog/what-is-the-science-of-reading-and-why-does-it-matter/

Verstegen, D. M., Chan, T. M., Weygandt, P. L., & Scerbo, M. W. (2016). The effectiveness of problem-based learning in health professions education: A systematic review. *Medical Education*, *50*(7), 707-721. https://doi.org/10.1111/medu.13000

Wagner, R. K., Torgesen, J. K., Rashotte, C. A., & Pearson, N. A. (2011). *Test of word reading efficiency* (2nd ed.). Pro-Ed.

Wagner, R. K., Torgesen, J. K., Rashotte, C. A., Hecht, S. A., Barker, T. A., Burgess, S. R., Donahue, J., & Garon, T. (1997). Changing relations between phonological processing abilities and word-level reading as children develop from beginning to skilled readers: A 5-year longitudinal study. *Developmental Psychology*, *33*(3), 468-479. https://doi.org/10.1037/0012-1649.33.3.468