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IMPLEMENTATION OF PROJECT BASED LEARNING IN THE COMPILATION OF STUDENTS' SCIENTIFIC ARTICLES: A CASE STUDY

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ABSTRAK

Kemampuan menulis artikel ilmiah merupakan kompetensi penting yang harus dimiliki mahasiswa di perguruan tinggi. Namun, masih banyak mahasiswa yang mengalami kesulitan dalam proses penulisan artikel ilmiah akibat keterbatasan pengalaman riset dan pendekatan pembelajaran yang cenderung berorientasi teoretis. Penelitian ini bertujuan untuk mendeskripsikan implementasi Project-Based Learning (PjBL) pada mata kuliah Riset dan Publikasi Ilmiah serta perannya dalam menghasilkan artikel ilmiah mahasiswa. Penelitian ini menggunakan pendekatan kualitatif dengan desain studi kasus yang melibatkan 17 mahasiswa semester enam Program Studi Tadris Matematika di Institut Agama Islam Negeri (IAIN) Kerinci. Data dikumpulkan melalui observasi pembelajaran, wawancara mendalam, dan dokumentasi artikel ilmiah mahasiswa, kemudian dianalisis menggunakan model analisis interaktif yang meliputi reduksi data, penyajian data, dan penarikan kesimpulan. Hasil penelitian menunjukkan bahwa implementasi PjBL berjalan dengan baik, terutama pada tahap orientasi masalah dan penyusunan artikel ilmiah, sementara tahap perencanaan proyek, pengumpulan data, dan refleksi berada pada kategori sedang. Sebagian besar mahasiswa memandang PjBL sebagai pengalaman belajar yang bermakna dan autentik, serta mampu menghasilkan artikel ilmiah dengan struktur IMRaD yang lengkap dan kualitas cukup hingga baik. Temuan ini menunjukkan bahwa PjBL merupakan pendekatan pembelajaran yang efektif untuk meningkatkan kemampuan menulis artikel ilmiah mahasiswa di perguruan tinggi.
Kata kunci: project-based learning; artikel ilmiah; pendidikan tinggi

ABSTRACT

The ability to write scientific articles is an essential competence for university students, yet many still encounter difficulties due to limited research experience and theory-oriented instructional approaches. This study aims to examine the implementation of Project-Based Learning (PjBL) in the Research and Scientific

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Publication course and its role in facilitating the production of students' scientific articles. Using a qualitative case study design, the research involved 17 sixth-semester students of the Mathematics Education Department at the State Islamic Institute (IAIN) Kerinci. Data were collected through classroom observations, in-depth interviews, and documentation of students' scientific articles, and analyzed using an interactive model of data reduction, data display, and conclusion drawing. The findings indicate that PjBL was generally implemented effectively, particularly in the stages of problem orientation and article writing, while project planning, data collection, and reflection were implemented at a moderate level. Most students perceived PjBL as a meaningful and authentic learning experience that enhanced their understanding of research processes and scientific article structure. Furthermore, the majority of students were able to produce complete IMRaD-structured articles with adequate to good quality. These results suggest that PjBL is a promising instructional approach for improving students' scientific writing skills in higher education.
Keywords: project-based learning; scientific writing; higher education

INTRODUCTION

The ability to write scientific articles is a fundamental competence for university students, particularly within higher education contexts that emphasize academic literacy, scientific productivity, and meaningful contributions to knowledge development. Scientific writing not only serves as a graduation requirement, such as thesis completion, but also functions as a gateway for students to engage with the academic community and prepare for future scholarly careers. Through the process of writing scientific articles, students are trained to think critically, formulate research problems, analyze data, and communicate ideas systematically and logically. Previous studies have confirmed that structured strategies and academic writing training significantly enhance students' understanding of scientific writing conventions and publication processes.[1]

[1] Fida P Musaffak, "Penerapan Strategi Mind Mapping Sebagai Upaya Peningkatan Kemampuan Mahasiswadalam Menulis Artikel Ilmiah," *Belajar Bahasa Jurnal Ilmiah Program Studi Pendidikan Bahasa Dan Sastra Indonesia* 3, no. 2 (2018), https://doi.org/10.32528/bb.v3i2.1589; Muhammad Rafiek, Rusma Noortyani, and Noor Fajriah, "Pelatihan Penulisan Artikel Jurnal Dan Pengenalan Aplikasi Mendeley Bagi Mahasiswa S1 Universitas Palangka Raya," *Bubungan Tinggi Jurnal Pengabdian Masyarakat* 4, no. 4 (2022): 1342, https://doi.org/10.20527/btjpm.v4i4.5801; Putri H Pebriana, Yolanda Pahrul, and Mufarizuddin Mufarizuddin, "Pelatihan Penulisan Karya Ilmiah Bagi Mahasiswa Universitas Pahlawan Tuanku Tambusai," *Journal of Human and Education (Jahe)* 2, no. 1 (2022): 9–12, https://doi.org/10.31004/jh.v2i1.34.

Despite its importance, numerous studies report that many students still experience substantial difficulties in planning, composing, and publishing scientific articles in a coherent and systematic manner. These challenges include limited understanding of article structure, weak mastery of academic language, and insufficient familiarity with citation and publication procedures.[2] In addition, students' publication rates remain relatively low, largely due to inadequate guidance and limited exposure to authentic writing experiences during their studies.[3] As a result, scientific writing is often perceived as a complex and intimidating task rather than a meaningful academic practice.

One of the major causes of these difficulties lies in instructional approaches that remain predominantly lecture-centered and theoretically oriented. Such approaches provide limited opportunities for students to actively experience the research and writing process, causing scientific writing activities to become abstract and disconnected from real academic practice. Studies have shown that learning environments with minimal hands-on engagement tend to hinder students' motivation, creativity, and writing productivity.[4] Without experiential learning, students struggle to internalize the logic of research-based writing and to develop confidence in producing publishable academic work.

If this condition persists, higher education institutions risk experiencing stagnation in research culture, low student publication output, and weakened competencies in critical thinking, collaboration, and scientific literacy—skills that are essential in today's global academic landscape. Moreover, students who are not accustomed to writing scientific articles during their undergraduate studies may encounter significant obstacles in postgraduate education and academic professions. Empirical evidence suggests that without project-oriented instructional

[2] Natalia R Rawa, Dek N L Laksana, and Aan Nurfahrudianto, "Sharing Session: Pencegahan Tindakan Plagiarisme Dalam Penulisan Karya Ilmiah Mahasiswa Stkip Citra Bakti Sharing Session: Pencegahan Tindakan Plagiarisme Dalam Penulisan Karya Ilmiah Mahasiswa Stkip Citra Bakti," *Selaparang Jurnal Pengabdian Masyarakat Berkemajuan* 4, no. 3 (2021): 607, https://doi.org/10.31764/jpmb.v4i3.4811; Sultan Sultan and Dwi Yulianingsih, "Klasifikasi Kesalahan Dan Hambatan Penggunaan Bahasa Indonesia Sebagai Bahasa Akademik Pada Mahasiswa FTK Uin Mataram," *El-Tsaqafah Jurnal Jurusan Pba* 19, no. 1 (2020): 72–87, https://doi.org/10.20414/tsaqafah.v19i1.2345; Sudarmanto Jayanegara et al., "PKM Pelatihan Penulisan Artikel Ilmiah Sebagai Kiat Sukses Untuk Menulis PKM-AI Dan PKM-GT Bagi Mahasiswa," *Teknovokasi* 1, no. 2 (2023): 114–20, https://doi.org/10.59562/teknovokasi.v1i2.135.

[3] Laura Yuni Suryani and Imam Yuliadi, "Peran Media Sosial Tiktok Terhadap Perubahan Pola Interaksi Sosial Remaja Di SMK Kesehata Al-Ma'arif Sumbawa Tahun 2022," *Jurnal Ilmu Sosial* 1, no. 1 (2022): 18–21, http://jurnal.uts.ac.id/index.php/hjis/index.

[4] Pebriana, Pahrul, and Mufarizuddin, "Pelatihan Penulisan Karya Ilmiah Bagi Mahasiswa Universitas Pahlawan Tuanku Tambusai"; Ni L P Riskayanti, I N Karsana, and I G G Putra, "Penerapan Model Pembelajaran Kontekstual Dalam Mata Pelajaran Pendidikan Agama Hindu Dan Budi Pekerti Pada Siswa Kelas Xi Di Sma Negeri 7 Denpasar," *Up* 4, no. 2 (2023): 143–51, https://doi.org/10.25078/up.v4i2.2784.

interventions, students' motivation for scientific writing remains stagnant and the quality of their written products tends to be unsatisfactory.[5]

In response to these challenges, the need for contextual and practice-based learning models has become increasingly urgent. Contextual learning emphasizes the connection between academic content and real-life situations, allowing students to construct knowledge through meaningful experiences.[6] When combined with practical activities, such approaches have been shown to improve learning motivation, engagement, and retention.[7] In the context of scientific writing, students require authentic research experiences that enable them to apply theoretical knowledge directly within the writing process.

Project-Based Learning (PjBL) has emerged as a promising instructional model to address these needs. PjBL emphasizes learning through real-world projects, guiding students through a structured process that includes problem formulation, project planning, data collection, analysis, drafting, revision, and final evaluation. Numerous studies have demonstrated that PjBL effectively enhances students' critical thinking, creativity, collaboration, and scientific writing skills.[8] Furthermore, PjBL supports collaborative learning and iterative feedback, which are crucial elements in producing high-quality scientific articles.[9]

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[5] Izwar and D Kristianti, "Penerapan Model Project Based Learning (PjBL) Untuk Meningkatkan Kemampuan Menulis Artikel Ilmiah Dan Motivasi Belajar Mahasiswa Dalam MBKM," *Jurnal Bionatural* 10, no. 1 (2023): 31–41, https://ejournal.stkipbbm.ac.id/index.php/bio/article/view/179; Widiastuti Widiastuti and Hestilia O Yurita, "Tantangan Implementasi Kurikulum 2013 Dalam Pembelajaran Matematika Di Sekolah Dasar," *Jispe Journal of Islamic Primary Education* 4, no. 2 (2023): 71–77, https://doi.org/10.51875/jispe.v4i2.266.

[6] R O Sihotang and Sonya F Tauran, "Pembelajaran Kontekstual Tipe Hands on Activity Dan SAVI (Somatic, Auditory, Visual and Intelectual) Untuk Meningkatkan Kemampuan Pemahaman Matematis Siswa SMP," *Jurnal Padegogik* 3, no. 1 (2020): 45–56, https://doi.org/10.35974/jpd.v3i1.2232.

[7] Nur E Zakiah, Yoni Sunaryo, and Asep Amam, "Implementasi Pendekatan Kontekstual Pada Model Pembelajaran Berbasis Masalah Berdasarkan Langkah-Langkah Polya," *Teorema Teori Dan Riset Matematika* 4, no. 2 (2019): 111, https://doi.org/10.25157/teorema.v4i2.2706; Esta A Putri and Arindra T Widiansyah, "Penerapan Model Pembelajaran Kontekstual Melalui Video Pembelajaran Untuk Meningkatkan Hasil Belajar Ipas," *Jppii* 13, no. 3 (2023): 126–31, https://doi.org/10.23887/jppii.v13i3.73440.

[8] Agus Setiawan, Efektifitas Pembelajaran Kolaboratif Berbasis Online Terintegrasi E-Akademik Terhadap Kemampuan Berpikir Kritis dan Sikap Terhadap Matematika Wawan, and Article History, "Efektifitas Pembelajaran Kolaboratif Berbasis Online Terintegrasi E-Akademik Terhadap Kemampuan Berpikir Kritis Dan Sikap Terhadap Matematika," *Jurnal Teknologi Pembelajaran* 1, no. 02 (August 2021), https://doi.org/10.25217/JTEP.V1I02.1760; F R F Ramadani, "Studi Literatur; Analisis Tujuan Pendidikan Terhadap Kurikulum Merdeka Belajar Dalam Menghadapi Tantangan Pendidikan Era …," *Pendas: Jurnal Ilmiah Pendidikan Dasar*, 2023, https://www.journal.unpas.ac.id/index.php/pendas/article/view/7570.

[9] Ilmatus Sa'diyah et al., "Pengembangan Metode Project Based Learning 'Ruang Literasi' Untuk Peningkatan Keterampilan Menulis Artikel Ilmiah Mahasiswa Melalui Model Hybrid

Although previous research has extensively examined the effectiveness of PjBL in improving general writing skills, research proposals, or students' perceptions, limited studies have explored its implementation specifically in courses on Research and Scientific Publication aimed at producing student articles ready for journal submission. Therefore, this study offers novelty by focusing on the implementation of PjBL within such a course, analyzing not only the final writing products but also the learning process, collaborative dynamics, project management, challenges, and supporting factors within the context of the Merdeka Belajar–Kampus Merdeka (MBKM) policy. Using a qualitative case study approach, this research seeks to address the following question: How is Project-Based Learning implemented in the process of developing students' scientific articles within this case study context?

RESEARCH METHODS

This study employed a qualitative approach using a case study design to gain an in-depth understanding of the implementation of Project-Based Learning (PjBL) in facilitating the production of students' scientific articles within a specific instructional context. The qualitative approach was chosen to capture the natural dynamics of the learning process, students' experiences, and the meanings they constructed throughout their engagement in PjBL activities.[10] The case study design was considered the most appropriate as the research focused on a single bounded case, namely the Research and Scientific Publication course at the State Islamic Institute (IAIN) Kerinci, allowing for a comprehensive exploration of the instructional processes and learning phenomena as they occurred in their real-life setting.[11]

The research participants consisted of 17 sixth-semester students enrolled in the course during the academic year, all of whom were included through a total sampling technique due to the relatively small population size[12]. Data were

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[10] W John Creswell and J David Creswell, *Research Design: Qualitative, Quantitative Adn Mixed Methods Approaches*, *Journal of Chemical Information and Modeling*, 2018; W N Kartadireja, Dadang Anshori, and Dadang Sunendar, "Pemahaman Bahasa Melalui Pengalaman Proyek: Studi Kualitatif Pada Implementasi PjBL," *Jurnal Onoma: Pendidikan, Bahasa, Dan Sastra* 10, no. 1 (2024): 426–38, https://doi.org/10.30605/onoma.v10i1.3293.

[11] R K Yin, *Case Study Research and Applications: Design and Methods*, 2018.

[12] Sugiyono, *Metode Penelitian Kuantitatif, Kualitatif, Dan R&D* (Bandung: Alphabet, 2019).

collected from May 25 to June 16, 2023, coinciding with the full implementation of the PjBL stages, from problem identification to scientific article development. The data comprised process data related to the implementation of PjBL and product data in the form of students' final scientific articles. Data collection techniques included classroom observations to examine the enactment of PjBL syntax, in-depth interviews to explore students' perceptions and learning experiences, and documentation of learning activities and written products to corroborate the findings. Data analysis followed the interactive model proposed by Miles and Huberman, involving data reduction, data display, and conclusion drawing conducted iteratively throughout the research process.[13] The trustworthiness of the findings was ensured through methodological triangulation by cross-checking data from observations, interviews, and documentation.[14]

RESULTS AND DISCUSSION

Results

Research Context and Participants

This study involved all sixth-semester students from the Mathematics Education Department at the State Islamic Institute (IAIN) Kerinci who were enrolled in the Research and Scientific Publication course during the even semester of the academic year. The total number of participants was 17 students, and all were included as research subjects due to the relatively small population size. The use of total participation allowed the researcher to capture the implementation of Project-Based Learning (PjBL) comprehensively without sampling bias. Data were collected through direct classroom observation, in-depth interviews, and analysis of the scientific articles produced by the students. Consequently, the findings represent the overall classroom condition and provide a holistic depiction of the learning process.

The primary objective of this study was to answer the research question concerning how Project-Based Learning was implemented in the Research and Scientific Publication course to facilitate the production of students' scientific articles. The investigation focused on several aspects, including the stages of PjBL implementation, students' experiences during the article-writing project, the quality of the final written products, and students' perceptions of the effectiveness of PjBL. Guided by a qualitative case study approach, the results are presented based on empirical evidence derived from classroom observations, interview data, and

[13] M B Miles, A M Huberman, and J Saldaña, "Qualitative Data Analysis," *Sage*, 2020.
[14] Creswell and Creswell, *Research Design: Qualitative, Quantitative Adn Mixed Methods Approaches*.

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documentation of learning activities and written outputs. In line with qualitative research conventions, this section reports descriptive findings only and does not include theoretical interpretation or discussion.

Findings from Classroom Observation of PjBL Implementation

Classroom observations were conducted throughout the entire instructional period, from May 25 to June 16, 2023. The observation data indicated that the implementation of Project-Based Learning followed the core PjBL syntax, namely problem orientation, project planning, project execution, product development, and reflection. Overall, the learning process was systematically organized and aligned with the intended project objectives. However, the level of implementation varied across different stages of the PjBL process. These variations reflected differences in students' readiness, research skills, and familiarity with scientific writing practices.

The problem orientation stage was implemented at a high level of effectiveness. All students were able to identify research topics relevant to mathematics education, drawing on their microteaching experiences, observed learning difficulties among students, or personal academic interests. Common themes included misconceptions in basic mathematics and the use of digital learning media. This stage encouraged students to connect theoretical concepts with real educational contexts, indicating that PjBL effectively supported meaningful problem identification. The active engagement observed during this phase demonstrated students' ability to contextualize research issues within authentic learning environments.

In contrast, the project planning stage showed a moderate level of implementation. Observation revealed that 12 out of 17 students experienced difficulties in designing research procedures, particularly in developing research instruments such as interview guidelines and observation sheets. As a result, intensive lecturer guidance was required, including providing examples, revising drafts, and offering step-by-step feedback. These challenges affected the subsequent data collection stage, which was also categorized as moderate. Several students encountered technical obstacles such as limited access to research sites, time constraints, and incomplete data collection.

The article-writing stage represented the most significant improvement among students. After several rounds of guidance and feedback, most students were able to organize their articles according to the IMRaD structure (Introduction, Method, Results, and Discussion). Fourteen students successfully produced complete articles, while three students required further revision, particularly in the method and discussion sections. The presentation stage proceeded smoothly, with students able to explain their research processes clearly. However, reflective

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activities were not fully optimized, as students tended to focus more on presenting results than critically evaluating their learning challenges.

Findings from In-Depth Interviews

In-depth interviews were conducted with all participants to explore their learning experiences during the PjBL implementation. Analysis of the interview data revealed three major themes: students' perceptions of PjBL, challenges encountered during the research process, and the perceived impact of PjBL on their scientific writing skills. These themes provide insight into how students experienced the learning model beyond observable classroom behaviors. The interview findings complement the observation data by highlighting students' subjective perspectives.

Regarding students' perceptions of PjBL, the majority of participants (15 out of 17 students) reported that PjBL offered a more meaningful learning experience compared to conventional lecture-based instruction. Students emphasized that direct involvement in the entire research process enhanced their understanding of how research is conducted in practice. Several students expressed that PjBL enabled them to "learn research in a real way" rather than merely memorizing theoretical concepts. This perception suggests that PjBL successfully fostered experiential learning and increased students' engagement with scientific inquiry.

The second theme concerned challenges faced during the research process. Eleven students reported difficulty in formulating research problems that were sufficiently specific and feasible within a limited timeframe. Data collection was another major challenge, as students encountered restricted access to schools, limited experience conducting interviews, and uncertainty in performing systematic observations. Time management also emerged as a significant issue, given the relatively short research period and the need for repeated revisions. Additionally, students identified literature review writing and discussion sections as the most difficult components of scientific article writing.

The third theme focused on the perceived impact of PjBL on students' scientific writing abilities. Sixteen students stated that PjBL helped them better understand the structure and logic of scientific articles. They reported increased confidence and reduced anxiety toward academic writing, particularly regarding future research tasks. Students also noted that they became more aware of the logical connections between research questions, methods, and results. These responses indicate that PjBL contributed positively to students' conceptual understanding of scientific writing.

Findings from Documentation of Students' Scientific Articles

Documentation analysis was conducted on all scientific articles produced by the students. The analysis focused on structural completeness, formatting accuracy, content quality, and adherence to academic writing conventions. In terms of structure, 14 out of 17 articles fully followed the IMRaD format, while three articles required revision due to incomplete method or discussion sections. This finding indicates that most students were able to apply the standard structure of scientific writing effectively.

Regarding formatting accuracy, 12 articles adhered to standard academic conventions, including the use of APA-style citations and consistent numbering of tables and figures. The remaining five articles displayed inconsistencies in reference formatting and data presentation. These issues were primarily related to citation management and technical aspects of academic writing. Although these errors did not significantly affect content quality, they highlighted areas where further guidance is needed.

An analysis of content quality categorized the articles into three levels: good, adequate, and poor. Seven articles were classified as good, characterized by clear argumentation, relevant use of references, and logical analysis. Eight articles were categorized as adequate, as they presented relevant ideas but lacked depth in discussion and critical analysis. Two articles fell into the poor category due to general statements unsupported by empirical data and unsystematic analysis. These findings illustrate varying levels of writing proficiency among students, reflecting both the strengths and limitations of the PjBL implementation.

Discussion

The findings of this study indicate that the implementation of Project-Based Learning (PjBL) in the Research and Scientific Publication course at IAIN Kerinci was generally successful in supporting students' scientific writing development. Classroom observations showed that the problem orientation and article-writing stages were implemented at a high level, while project planning, data collection, and reflection were carried out at a moderate level. Interview data further revealed that most students perceived PjBL as a meaningful and challenging learning experience, despite encountering difficulties related to problem formulation, data collection techniques, time management, and academic writing. Documentation of students' final articles demonstrated that the majority of participants were able to produce complete IMRaD-structured articles with quality ranging from adequate to good. Overall, the interactive data analysis confirms that PjBL effectively facilitated students' engagement in authentic research and article production, although notable challenges remained in several project stages.

These results are consistent with previous studies highlighting the effectiveness of PjBL in higher education contexts. Izwar and Kristianti reported

that the application of PjBL within the Merdeka Belajar–Kampus Merdeka (MBKM) framework significantly improved students' scientific writing skills and learning motivation.[15] Similarly, Suprapti and Lubis found that PjBL enabled students to produce scientific writing with good quality and increased perseverance during the writing process, even at the secondary education level.[16] Although these studies were conducted in different educational settings, the similarities in outcomes reinforce the adaptability and relevance of PjBL for scientific writing instruction. Collectively, these findings suggest that PjBL provides a structured and meaningful framework for developing academic writing competencies across educational levels.

From a theoretical perspective, the findings support constructivist learning principles, which emphasize active knowledge construction through experience, reflection, and social interaction. In line with constructivist theory, students in this study were positioned as active learners who designed research topics, conducted investigations, and produced scientific articles, while the lecturer functioned as a facilitator. This process aligns with social constructivism, particularly Vygotsky's view that learning occurs through guided interaction within a supportive environment.[17] Furthermore, the experiential learning cycle proposed by Kolb—comprising concrete experience, reflective observation, abstract conceptualization, and active experimentation—was evident throughout the PjBL process. Students engaged in concrete research activities, reflected through feedback and discussion, conceptualized research principles, and applied them in revising and refining their articles.

At the same time, the moderate level of implementation observed during the project planning, data collection, and reflection stages suggests that students' limited prior research experience and the short project duration posed significant constraints. Many students struggled to design research instruments, access participants, and allocate sufficient time for deep reflection. This finding aligns with previous research emphasizing the need for scaffolding and intensive instructor

[15] Izwar and Kristianti, "Penerapan Model Project Based Learning (PjBL) Untuk Meningkatkan Kemampuan Menulis Artikel Ilmiah Dan Motivasi Belajar Mahasiswa Dalam MBKM."

[16] Suprapti Suprapti, "Penerapan Model Project Based Learning Dalam Pembelajaran Menulis Karya Ilmiah Di SMAN 1 Pule Trenggalek," *ENGGANG: Jurnal Pendidikan, Bahasa, Sastra, Seni, Dan Budaya* 3, no. 1 (2022): 181–189, https://doi.org/10.37304/enggang.v3i1.8424; S H Lubis, *EFL Teachers' Agency in the New Curriculum of Merdeka Belajar: A Case Study at Yogyakarta Regency* (digilib.uns.ac.id, 2023), https://digilib.uns.ac.id/dokumen/detail/108690/.

[17] Sugrah Nurfatimah, "Teori Kontuktivisme," *Humanika* 19 (2), no. Kajian Ilmiah Mata Kuliah Umum (2019): 121–38.

support in PjBL, particularly for novice researchers.[18] From a social constructivist perspective, these challenges can be explained through Vygotsky's concept of the Zone of Proximal Development (ZPD), where learners require structured assistance to complete tasks beyond their independent capabilities.[19] Without adequate scaffolding, limited experience and time constraints can hinder the effectiveness of critical project stages.

In terms of implications, this study reinforces the theoretical relevance of constructivist and experiential learning theories in scientific writing instruction at the university level. Practically, it suggests that lecturers should carefully design PjBL projects by allocating sufficient time for planning and data collection, providing early training on research instruments, and ensuring structured opportunities for reflection and revision. The lecturer's role as a facilitator is particularly crucial in supporting students who are new to research practices. In conclusion, this study affirms that PjBL is a powerful and relevant approach for developing students' scientific writing skills in higher education, while also highlighting the importance of pedagogical scaffolding and thoughtful project design to address persistent challenges.

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[18] Izwar and Kristianti, "Penerapan Model Project Based Learning (PjBL) Untuk Meningkatkan Kemampuan Menulis Artikel Ilmiah Dan Motivasi Belajar Mahasiswa Dalam MBKM."

[19] Y. R. Salsabila and M. Muqowim, "Korelaso Antara Teori Belajar Konstruktivisme Lev Vygotsky Dengan Model Pembelajaran Problem Based Learning (PBL)," *LEARNING : Jurnal Inovasi Penelitian Pendidikan Dan Pembelajaran* 4, no. 3 (2024): 813–27, https://doi.org/10.51878/learning.v4i3.3185.

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