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Outcome Analysis of Project-Based Training on Book Chapter Writing for Elementary School Teachers

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Abstract: This study aims to evaluate the effectiveness of a training project using the Project-Based Learning (PPjBL) model in enhancing elementary school teachers' competencies in writing and documenting best practices into book chapters. This study employs a mixed-methods approach with a pre-experimental design (one-group pretest–posttest design). The study participants consisted of 9 elementary school teachers selected using saturation sampling. Quantitative data were obtained through pretest and posttest assessments of writing skills, while qualitative data were collected through observations of the implementation of the PPjBL model and perception questionnaires. The results showed a significant improvement in teachers' writing skills after the training ($p < 0.01$), particularly in the aspects of content, structure, and academic language. The implementation of the PPjBL model fell into the "mostly implemented" category with an average score of 3.25, indicating that the model's stages were carried out fairly optimally. In addition, teachers' perceptions of the PPjBL model fell into the "very positive" category, with an average score of 3.54, particularly regarding the aspects of relevance and the ability to produce tangible outputs in the form of books. These findings indicate that PPjBL is effective and relevant as a project-based training model focused on publication-oriented outputs. This study contributes to the development of a professional teacher training model that not only enhances competencies but also produces tangible outcomes that can be utilized within the educational community.

Keywords: Elementary School, PjBL, Project-Based Learning, Teacher Training

Introduction

The professional competencies of elementary school teachers encompass not only classroom teaching skills but also the ability to reflect on and document teaching practices as part of ongoing professional development. Systematic documentation enables teachers to build practice-based pedagogical knowledge that can be shared with the broader educational community (Agyei & Keengwe, 2014). In this context, teachers serve not only as facilitators of learning but also as producers of professional knowledge.

The publication of scholarly works, such as journal articles and book chapters, serves as a key means of disseminating effective teaching practices and enriching the practice-based educational literature (Bajwa & Sawhney, 2016; Ecarnot et al., 2015; Iskandar et al., 2018). However, the process of scientific writing is a complex activity that requires skills in organizing ideas, constructing logical arguments, and following a systematic academic structure (Ecarnot et al., 2015). Therefore, the development of scientific writing competencies for teachers requires a training approach

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that is not only theoretical but also provides targeted and sustained practical experience.

One approach that has the potential to address these needs is Project-Based Learning (PjBL). This model emphasizes the active involvement of participants in completing authentic projects that result in tangible products (Dubickis & Gaile-Sarkane, 2017; Guo et al., 2020; Matilainen et al., 2021). In the context of professional training, PjBL enables the integration of knowledge, skills, and reflection through systematic stages, ranging from problem formulation to product evaluation (Aldabbus, 2018; Bell, 2010). Thus, PjBL has the potential to be a relevant approach for product-based scientific writing training, such as the drafting of book chapters.

Nevertheless, various studies indicate that teachers still face challenges in writing scholarly papers, such as limited experience, a lack of guidance, and difficulty in translating teaching practices into academic writing (Ertikanto et al., 2017; Sutirman & Yuliansah, 2015). Furthermore, available training tends to be theoretical and not yet oriented toward the production of tangible work, thus failing to yield concrete publication outputs (Tambaip & Rediani, 2022).

On the other hand, research on PjBL has largely focused on its implementation in classroom learning and the development of 21st-century skills (Guo et al., 2020; Harefa et al., 2023). Studies examining the application of PjBL in the context of teacher professional development training, particularly for producing publications such as book chapters, remain limited. Furthermore, existing research generally only assesses participants' competency gains without integrating an analysis of the alignment of the model's implementation, the quality of the resulting products, and participants' perceptions of the training process. Thus, there is a research gap in the lack of studies that comprehensively examine the effectiveness of the PjBL model in training teachers in scientific writing oriented toward publication, taking into account process, outcomes, and participants' perceptions simultaneously.

Given this gap, this study aims to comprehensively analyze the implementation of the Project Training with Project-Based Learning (PPjBL) model in the writing of textbook chapters for elementary school teachers. Specifically, this study aims to: 1) analyze the alignment of training implementation with the PPjBL model's framework; 2) evaluate the impact of the PPjBL model on teachers' ability to write and document best practices; and 3) examine teachers' perceptions of the quality, relevance, and implementation of the PPjBL model in producing the final product a book chapter.

This study is expected to contribute to the development of a professional teacher training model that not only enhances competencies but also produces tangible and beneficial publications for the educational community

Method

Types of Research

This study adopts a descriptive approach to assess the effectiveness of the PPjBL model on elementary school teachers' book chapter writing competency. A quantitative descriptive approach was used to examine the improvement in teachers' writing skills by comparing the results of the initial and final assessments, as well as to assess teachers' perceptions of the implementation of the PPjBL model using a scaled questionnaire (Sugiyono, 2015). Meanwhile, a qualitative descriptive approach was used to examine the implementation of the PPjBL syntax, explore teachers' experiences, challenges, and self-efficacy, and assess the quality of the final product (book chapter), thereby producing holistic and valid data on the success of this training intervention (Wijaya et al., 2025).

In terms of design, this study employs a mixed-methods approach using an embedded design (Creswell, 2022), in which quantitative data serve as the primary data, supported by qualitative data to strengthen the interpretation of the results. Furthermore, from an experimental perspective, this study employs a pre-experimental design (one-group pretest–posttest design), as it involves only one group without a control group, with measurements taken before and after the implementation of the PPjBL model.

Research Location and Time

The research was conducted at an elementary school in Kupang Regency, NTT Province, every Saturday, starting from the third week of October 2024 to the third week of November 2024. The subjects of this study were all teachers teaching grades 1 to 6, as well as religious teachers, the principal, and the library manager at the elementary school. The sampling technique used was saturated sampling (Sugiyono, 2015).

The sample size for this study was nine teachers. Given the relatively small sample size and the fact that the study was limited to a single location, the findings are not intended to be broadly generalized but rather to provide a contextual and exploratory overview of the effectiveness of the PPjBL model in scientific writing training for teachers.

Research Instruments

The instruments used in this study include: 1) a rubric for assessing book chapter writing skills, 2) an observation sheet for the implementation of PPjBL syntax, and 3) a teacher perception questionnaire.

The writing ability assessment rubric was developed based on several indicators, namely: a) writing structure (alignment with the book chapter's systematic organization), b) clarity of ideas and arguments, c) depth of content and relevance to learning practices, d) use of academic language, and e) completeness of references. Each indicator was evaluated using a specific scale to generate a quantitative score.

The validity of the instruments was established through expert judgment by experts in education and scientific writing. Meanwhile, the reliability of the instruments was tested using Cronbach's Alpha internal consistency to ensure the consistency of the measurement results.

Data Analisis and Research Procedures

The data analysis technique in this study was quantitative, to measure the impact of the PPjBL model on improving teachers' writing skills. This was done by descriptively comparing the average scores on each aspect assessed before and after treatment using the PPjBL model. In addition, data from the teacher perception questionnaire was processed using descriptive statistics (means and percentages) to assess the level of acceptance of the implementation of the PPjBL model.

In addition to descriptive analysis, improvements in teachers' writing skills were also analyzed using inferential statistics specifically the nonparametric Wilcoxon test (since the data were not normally distributed) to determine the significance of the differences between pretest and posttest scores. The use of this test was intended to strengthen the conclusions regarding the effectiveness of the PPjBL model.

Qualitatively, observation data on the implementation of the PPjBL model syntax and data on teachers' experiences, challenges, and self-efficacy will be analyzed through thematic analysis (data reduction, data presentation, and conclusion drawing), in accordance with qualitative research principles (Supriandi, 2025; Syafei, 2025). This analysis will be reinforced by document analysis and scoring to assess the quality of the chapters produced. In the final stage, an integrative analysis will be conducted by comparing and correlating quantitative and qualitative results to provide holistic and valid conclusions regarding the effectiveness of the PPjBL model. The research procedure is illustrated in Figure 1.

Based on Figure 1, it can be stated that the research began with 1) the development of a teacher training model framework that adopted the PjBl model syntax, followed by 2) coordinating training participants to determine chapter titles and begin writing independently or collaboratively in groups. This stage produced the initial draft of the book chapters, which were then subjected to an initial assessment. 3) Implementation of the PPjBL model, during which the observer assessed the implementation of the steps. This stage produced the final draft of the book chapters. The study concluded with 4) an assessment of the final draft of the book chapters and the completion of a questionnaire on the participants' perceptions of the PPjBL model.

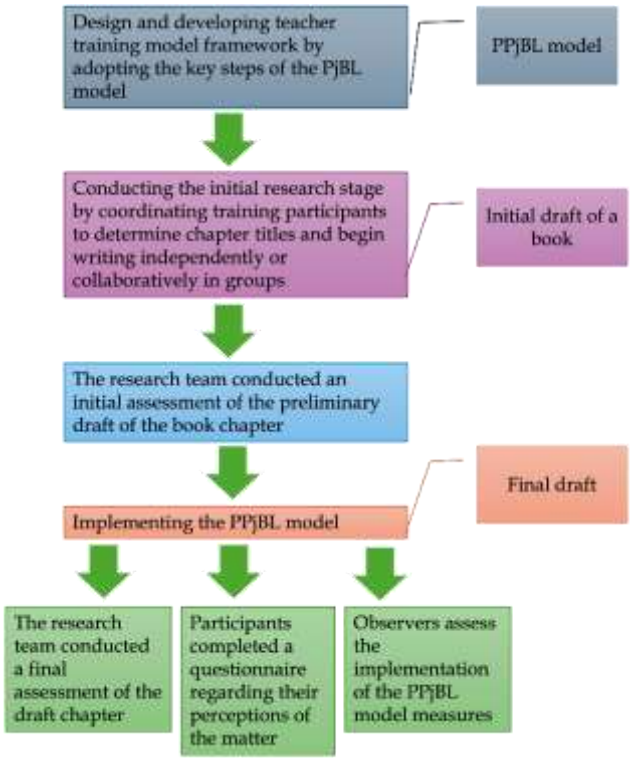

Figure 1. Stages of the research implementation procedure

Result and Discussion

Alignment of Training Steps with the Established PPJBL Model Syntax

The six main steps in the PPjBl model are used as a framework in designing this training process flow. Thus, the implementation of these steps can be presented in Table 1.

Based on the data in Table 1, it shows that the implementation of the PPjBl model for writing best practice books achieved a "Good" category with an overall average score of 3.25, indicating that all stages of PPjBL have been implemented for the most part and in a structured manner. The crucial stages that achieved a full score (4) were determining the fundamental questions (project theme presentation), compiling a schedule (timeline agreement), and monitoring progress (constructive feedback from facilitators), which shows that the project foundation, time management, and guidance support were prepared and executed

effectively and consistently. Meanwhile, most of the other indicators, including project output agreement, framework development guidance, manuscript feasibility testing (peer review), presentation of results, and process reflection and self-efficacy, scored 3 ("Mostly Implemented").

Table 1. Implementation of Book Writing Training Using The PJBL Model Stages (Syntax)

PjBL Model Stages	Key Indicators (Training Activities)	F	P	Score (1-4)
Start with the Essential Question	The facilitator explained the main theme of the project (writing a best practice book) and invited teachers to formulate "challenging questions" that needed to be answered.	v		4
	There is agreement on the project output (specifications of the book to be produced).	v	v	3
Design a Plan for the Project	The facilitator guides teachers in developing a writing framework (chapter outline, table of contents, target audience).	v		3
	Teachers independently or in groups formulate work plans and divide writing tasks.		v	3
Create a Schedule	Facilitators and teachers agree on a project timeline (e.g., deadline for submitting Chapter 1, revisions, finalization of the manuscript).	v		4
	Teachers are responsible for setting their own schedules to complete the writing project.		v	3
Monitor the Students and the Progress of the Project	Facilitators provide structured guidance/supervision (mentoring) during the writing process (drafting and revising manuscripts).	v		3
	There are weekly/regular progress monitoring sessions and constructive feedback from the facilitator.		v	4
Assess the Outcome	There is a manuscript eligibility testing session (peer review or evaluation by content experts/editors prior to publication).	v		3
	Teachers present or explain their progress/best practice results in front of their peers to obtain feedback.		v	3
Evaluate the Experience	The facilitator leads a reflection session (discussion) on the PjBL process that teachers have gone through (what they have learned, challenges, and solutions).	v		3
	Teachers wrote reflections on their increased competence and self-efficacy after completing the project.		v	3
Average Score				3.25

Special Notes for Table 1:
1. There are teachers who are participating in the Teacher Professional Education assessment, so they receive special service.
2. There are participants who are school principals, so they receive special service in the selection of materials;
3. There are participants who are library administrators, so they receive special service in the selection of materials.

Description For Table 1:
F = Facilitator (trainer/mentor) → whether the training activity was carried out by the facilitator (confirmed by the observer of the facilitator);
P = Participant (teacher/training participant) → whether the training activity appeared/was carried out by the participant (confirmed by the training participant).

Assessment Scale For Table 1:
4 = (Fully implemented): Activities are carried out completely, in a structured and effective manner;
3 = (Mostly implemented): Activities are carried out, but some minor components are omitted or less than optimal;
2 = (Partially implemented): Activities are carried out minimally, with many important components omitted;
1 = (Not implemented): The stages/activities do not appear to have been implemented at all.

The average assessment score can be interpreted using the following categories:
3.26 – 4.00 = "Fully Implemented" means that all stages of PjBL were carried out completely, in a structured and effective manner. Facilitators and participants showed high engagement in each stage;
2.51 – 3.25 = "Mostly Implemented" means that most stages of PjBL were implemented well, although some components were not yet optimal;
1.76 – 2.50 = "Partially Implemented" means that the implementation of PjBL only covers a small part of the main stages, with many important components not yet carried out or not carried out in depth;
1.00 – 1.75 = "Not Implemented" means that the PjBL stages do not appear to have been implemented or have been carried out to a very minimal extent.

The teacher training process based on the PPjBl model stages also produced book chapters as shown in Table 2.

Table 2. List of Chapter Titles from Best Practices

Author	Chapter Title
First grade teacher	The use of counting boards to improve numeracy skills
Second Grade Teacher	Using letter cards to improve reading skills
Third Grade Teacher	Card media for integer operations
Fourth Grade Teacher	Application of experimental methods to study the properties of substances
Fifth Grade Teacher	The discovery learning approach in science education
Sixth Grade Teacher	Problem-based learning on reproduction material
Religious Teacher	Dramatization of sacred texts in religious education
Library manager	School libraries as supporters of the learning process
Headmaster	Classroom observation as an effort to optimize teachers' pedagogical abilities

The following also shows a screenshot of the title and table of contents of the book in Figure 2.

Figure 2. Book Products Produced in Training That Implement the PjBL Model Syntax

Based on Table 2 and Figure 2, it can be stated that this study has successfully assisted participants in producing a book publication entitled "Effective Approaches in Elementary School Learning (My Great Teacher)" consisting of 9 chapters.

The alignment of training steps with the established PPJBL model syntax can be discussed as follows: first, the data obtained in Table 1 indicates that these important elements are already in place but still have room for optimization, for example, the depth of peer review sessions or the structure of personal reflection. Special notes also highlight the successful adaptation and differentiation of the PPjBL model to accommodate the diverse workloads and backgrounds of teachers (such as teachers who are also principals or are participating in PPG), proving the flexibility of the PPjBL model in maintaining the relevance of the project for each participant. Overall, the PPjBL model was successfully implemented with a strong foundation, although the details of product planning and experience evaluation still need refinement to achieve fully perfect implementation.

Furthermore, in the context of a pre-experimental research design (one-group pretest–posttest), the high level of implementation of the PPjBL model (mean score of 3.25) indicates that the treatment administered proceeded in accordance with the intervention design. This is important because in designs without a control group, the consistency of model implementation is a key factor in explaining changes in learning outcomes (Creswell, 2022). Thus, the internal validity of this study is strengthened by the relatively consistent implementation of the model.

The results of the observation show that the PPjBL model for writing book chapters for teachers achieved the category of "Mostly implemented" (average score of 3.25). This high level of implementation reinforces the view that PPjBL is a flexible and effective model for developing professional competencies oriented towards real products, as emphasized by (Maros et al., 2023) regarding the effectiveness of PjBL.

These findings are also consistent with previous research emphasizing that the success of PjBL is determined not only by the final outcomes but also by the quality of implementation at each stage, particularly during the driving question, planning, and monitoring phases (Aldabbus, 2018; Bell, 2010). In other words, the successful implementation of the syntax in this study reinforces the position of PPjBL as a model that is simultaneously process- and product-based.

The high scores in the stages of determining fundamental questions, scheduling, and monitoring progress (full score of 4) indicate the facilitators' success in building a solid project foundation. The stage of determining fundamental questions is key in PjBL because it provides focus and authentic goals for the project (Amelia & Santoso, 2021). Additionally, consistent progress monitoring (constructive feedback) is crucial because, in the context of writing long manuscripts such as book chapters, continuous support and guidance are prerequisites for project success, especially for participants with high workloads.

Although the project foundation is strong, most evaluation indicators scored 3 (mostly implemented), such as manuscript feasibility testing (peer review) and PPjBL process reflection.

This situation indicates that the metacognitive aspects of PjBL, such as reflection and self-evaluation, have not yet been fully optimized. In fact, according to self-regulated learning theory, reflection is a crucial component in internalizing learning experiences (English & Kitsantas, 2013; Zimmerman, 2002). Therefore, optimizing the reflection and peer review stages not only impacts the quality of the final product but also strengthens teachers' self-regulation skills as writers.

This indicates room for optimization, especially in elements that require in-depth interaction between participants and structured self-reflection. Less in-depth peer review sessions can reduce the quality of the final product, even though peer assessment is an integral part of PPjBL to improve manuscript quality and develop teachers' critical evaluation skills. Improvements in the evaluation and reflection stages are important to ensure that teachers not only produce products but also internalize the process and improve their self-efficacy.

Findings indicating the need for adaptation and differentiation for teachers with dual workloads (principals, administrators, PPG participants) are highly relevant to PjBL studies that emphasize adapting models to participant contexts (Tinenti et al., 2025a; Tinenti et al., 2024; Tinenti et al., 2025b). The need to adjust personal schedules and time allocation indicates that an effective PjBL model is one that is flexible and can be integrated with the real conditions and local wisdom (in this case, workload) of participants (Tinenti et al., 2025a). This flexibility ensures that the project remains relevant and can be completed, even if it means sacrificing a little perfection in the implementation of syntax in some detailed indicators, which ultimately justifies the success of PjBL as a sustainable training model.

The Impact of the PPjBl Model on Teachers' Ability to Write and Document Best Practices

The PPjBL model has an impact on three fundamental aspects that form the basis for assessing teachers' abilities/competencies in writing and documenting book chapters as the expected outcome. The results of the pretest and posttest data analysis, measured using a book chapter writing ability assessment sheet, are shown in Table 3.

Table 3. Pre-test and Post-test Data on Teachers' Ability to Write Book Chapters

Participant Number	Substance and Depth of the Problem		Structure and Logic Flow		Formal Language and Writing Style	
	Initial assessment	Final assessment	Initial assessment	Final assessment	Initial assessment	Final assessment
1	2	4	1	4	2	3
2	2	4	1	4	2	4
3	1	4	2	4	1	3
4	1	4	2	4	2	4
5	1	3	2	3	3	4
6	1	4	2	3	2	3
7	2	4	2	4	3	4
8	2	4	2	4	3	4
9	1	4	1	3	1	2
Average	1.44	3.89	1.66	3.78	2.11	3.44

Description For Table 3:
4 = excellent (fully implemented) means that the writing is complete, logical, and effective;
3 = good (mostly implemented) means that there are a few minor aspects that are not optimal;
2 = fair (partially implemented) means that many important components have not been implemented;
1 = poor (not implemented) means that the activity/writing does not demonstrate indicators of competence.
The averaged assessment scores can be interpreted in terms of teacher competence in these aspects as follows:
1.00 – 1.74 = "Very Low" means that competence in this aspect has not yet developed, and almost all indicators are not yet apparent;
1.75 – 2.49 = "Low" means that competence is beginning to develop but is still unstable and limited;
2.50 – 3.24 = "High" means that competence is quite good and most indicators are apparent;
3.25 – 4.00 = "Very High" means that competence is very good, with all indicators being met very effectively.

The results of the best practice document draft assessment show a significant improvement in teachers' writing skills after participating in PPjBL. This improvement is consistent across all three main assessment criteria. At the initial assessment stage, the average teacher score was in the "poor to adequate" category in all dimensions (Substance: 1.44 (very low); Structure: 1.66 (very low); Language: 2.11 (low)). This indicates that prior to the training, most teachers had

difficulty formulating specific and logical problems and had not presented implementation steps systematically.

After the PPjBL intervention, post-test scores increased dramatically, reaching the "good to very good" category in almost all dimensions. The most notable improvement occurred in the criteria of substance and depth of the problem and structure and logical flow, where the average score jumped from the initial assessment (substance: 1.44; structure: 1.66) to a final average score of 3.89 (very high) for substance and 3.78 (very high) for structure. This improvement was dominated by the achievement of a score of 4 (very good) in both dimensions by most participants. This indicates that the PPjBL model is very effective in helping teachers formulate high-urgency problems and develop detailed and coherent procedures for documenting their best practices. Meanwhile, language and formal writing style criteria also showed solid improvement, from an initial average score of 2.11 (low) to a final average score of 3.44 (very high). Although the improvement in language was not as dramatic as the improvement in substance and structure, these scores indicate that teachers were able to adopt the grammar and formal style required for academic writing. Overall, these data indicate that the PPjBL model has proven effective in fundamentally improving teachers' abilities, particularly in the aspects of logical problem formulation and best practice narrative structure development, which are important foundations in book chapter writing.

The results of the Wilcoxon Signed-Rank test indicate that there is a significant difference between the initial and final scores across all assessment aspects, namely the substance and depth of the issue ($T = 0$; $p < 0.01$), structure and logical flow ($T = 0$; $p < 0.01$), and formal language and writing style ($T = 0$; $p < 0.01$), indicating that the observed differences were not merely coincidental but rather the result of the PPjBL intervention. These findings reinforce the results of the descriptive analysis, which previously indicated improvements across all assessment aspects. The impact of the PjBL model on teachers' ability to write and document best practices can be discussed as follows. The significance of this increase in teacher competence strongly supports the literature stating that PjBL is very effective in improving learning outcomes, especially those oriented towards the creation of final products (Zhang & Ma, 2023).

Furthermore, the findings of this study address a gap in previous research—which generally focused only on improvements in student learning outcomes by demonstrating that PjBL is also effective in the context of teacher training and professional development based on published works. Thus, this study expands the scope of PjBL application from classroom instruction to teacher professional development.

In this context, the best practice draft acts as an initial product that requires teachers to apply their knowledge in a practical manner, rather than merely theoretically. PjBL, through its emphasis on completing complex tasks, successfully bridges the gap between classroom teaching practices and the ability to document them academically. Yulastri et al., (2018) also reinforce that the application of product-based modules produces more measurable and applicable learning outcomes, which is in line with the findings that teachers have successfully improved their abilities in the substance and structure of manuscripts. The most dramatic improvement was seen in the criteria of substance and depth of the problem as well as structure and logical flow.

This can be explained by the key characteristics of PjBL, which emphasize learning by doing, where participants actively construct knowledge through the completion of authentic projects (Vergara-Castañeda & Ben, 2021). In this context, students not only learn writing concepts but also immediately apply them in real-world contexts, resulting in more effective knowledge transfer. Meanwhile, improvements in language skills were relatively smaller compared to other areas. This suggests that the linguistic aspects of academic writing require more time for practice and specialized support, such as editing workshops or writing clinics. These findings are consistent with previous research indicating that academic language skills develop gradually and require more targeted interventions than conceptual thinking skills (Hyland, 2003).

This can be attributed to the intrinsic nature of PjBL, which requires participants to engage in critical thinking and problem solving (Saad & Zainudin, 2022). In writing training, PjBL forces teachers to organize their ideas, formulate authentic problems (substance), and systematically arrange solution steps (structure) to achieve a coherent final product. PjBL's focus on clear stages and strict supervision (as indicated by high observation scores on progress monitoring) ensures that teachers do not make leaps in their ideas but rather build their arguments step by step, thereby improving the coherence of the manuscript.

The key to the success of PjBL in writing lies in the effectiveness of constructive feedback from facilitators (Yu & Liu, 2021). In order to maximize language improvement, the implementation of PjBL must ensure that teachers not only receive feedback, but also develop their feedback literacy, namely, the ability to understand, evaluate, and act on corrections to revise manuscripts independently (Yu & Liu, 2021). Therefore, the sustainability of PjBL in writing must be

strengthened with a more structured peer review mechanism and mentoring that focuses on manuscript revision.

Teachers' Perceptions of Quality, Relevance, and Implementation of the PPjBL Model Stages in the Process of Producing the Final Product

This aspect was measured using a PPjBL perception questionnaire. Perception data was collected after the treatment. The data obtained is shown in Table 4.

Table 4. Data from the Perception Questionnaire for Teachers Who Received PPjBL Treatment

Indicators (PPjBL Syntax)	Statement (Focusing on Quality, Relevance, and Implementation of PjBL)	Average	
Relevance and Fundamental Questions (Syntax 1)	The theme of the best practice book writing project is very relevant and in line with my professional needs as a teacher.	3.88	3.72
	The process of formulating "fundamental questions" at the beginning of the training helped me focus on the core issues to be documented.	3.56	
Design and Planning Quality (Syntax 2 & 3)	The facilitated project design stage helped me to logically structure and organize the writing of the book.	3.78	3.73
	Breaking the project down into smaller steps (such as creating a schedule) makes the goal of writing a book more realistic and manageable.	3.67	
Implementation and Support (Syntax 4)	Mentoring or monitoring activities carried out by facilitators are very effective in overcoming specific difficulties in writing	3.33	3.28
	I felt that I received adequate collaborative support from my fellow participants during the book project process.	3.22	
Final Product Quality and Evaluation (Syntax 5 & 6)	The criteria for evaluating the results (manuscript feasibility test) in this project are clear and encourage me to produce a high-quality book.	3.55	3.48
	This project-based learning model (PjBL) is far more effective in producing tangible products (books) than conventional training.	3.78	
	The process of reflecting on and evaluating my experiences at the end of the training helped me understand the strengths and weaknesses of the best practices I wrote about.	3.11	
Teachers' Average Perception of the PPjBL Model		3.54	

Explanation:
1 = "Disagree/Very Poor" means that implementation is not good;
2 = "Disagree/Less Positive" means that implementation is not good;
3 = "Agree/Positive" means that implementation is good. 4 = "Strongly Agree/Very Positive" means that implementation is very good and as expected.
The averaged teacher perception scores can be interpreted into the following categories for each aspect:
1.00–1.74 = "Very Low," meaning that the implementation of the aspect is not yet going well; participants have not felt the benefits;
1.75–2.49 = "Low," meaning that the aspect has been implemented but there are still many weaknesses;
2.50–3.24 = "High," meaning that the aspect is being implemented well; participants feel the benefits with a few minor improvements needed;
3.25–4.00 = "Very High," meaning that the aspect is working very well; implementation is effective and in accordance with PjBL principles.

Based on the data in Table 4, it can be stated that overall, teachers participating in the training had a very positive perception (high to very high average scores) of the quality, relevance, and effectiveness of the PjBL model in helping to complete the book writing project. The overall average score (3.54/very high) indicates that the majority of teachers strongly agree that this training was effective and successful in accordance with the principles of the PjBL model.

Teachers' perceptions of the quality, relevance, and implementation of the PPjBL model stages in the process of producing the final product can be discussed as follows. The questionnaire results show that the teachers participating in the training had very positive perceptions of the PPjBL model, as evidenced by a high overall average score (3.54), placing their perceptions in the "agree" or "strongly agree" category regarding the quality and effectiveness of the training. This positive perception is a strong indicator of the success of PPjBL in achieving complex learning objectives, as reviewed by (Zhang & Ma, 2023), who emphasize the positive relationship between PjBL and learning effectiveness.

The highest score on the project theme relevance dimension (average 3.88) underlines the main strength of the PjBL model. This training is considered highly relevant to the professional needs of teachers. This high relevance (Amelia & Santoso, 2021) shows that PjBL successfully creates authentic tasks, where teachers work on real pro blems (best practices) that they face, making the book chapter writing project not only an academic task but also part of continuous professional development. Additionally, the formulation of

"fundamental questions," which also received a score of 3.56 (very high), proved to help teachers focus on the core of the problem, supporting the PjBL principle of providing clear guidance from the start of the project.

Teachers consistently gave high scores for the effectiveness of Project Design, Framework Development, and Small Step Division (average 3.73), reflecting that PPjBL successfully transformed a large task (writing a book) into realistic and manageable steps (Saad & Zainudin, 2022). Aspects that received slightly lower, but still positive, ratings were mentoring/monitoring activities (3.33/very high) and collaborative support from fellow participants (3.22/high). Although these scores indicate effectiveness, the presence of several scores of 3 suggests that differentiated support and specific needs when teachers encounter technical difficulties may require optimization (Tinenti et al., 2025c).

The most significant result was the teachers' perception that the PPjBL Model was far more effective in producing tangible products (books) than conventional training (Average 3.78/very high). This perception directly validates the product-based approach inherent in PjBL (Yulastri et al., 2018). The focus on the final product and the use of clear assessment criteria (manuscript feasibility test) proved effective in encouraging teachers to produce high-quality work. However, the dimensions of reflection and evaluation of experience received slightly lower scores (average 3.11/high). These findings are in line with the results of previous observations of implementation, confirming that although PjBL is strong in output and monitoring, the metacognitive and self-reflection aspects require more structured design and time to ensure that teachers not only complete the project but also internalize the lessons from the PjBL process in depth (Yu & Liu, 2021).

Conclusion

This study demonstrates that the PPjBL model is effective in enhancing elementary school teachers' competencies in writing and documenting best practices into published works in the form of book chapters. This is evidenced by three main findings. First, there was a significant improvement in teachers' writing skills, particularly in terms of content, structure, and academic language, as confirmed by inferential analysis of pretest and posttest results. Second, the implementation of the PPjBL model's syntax falls into the "mostly implemented" category, with a strong foundation in the problem formulation, planning, and monitoring stages. Third, teachers expressed a very positive perception of the quality, relevance, and effectiveness of the PPjBL model, particularly in producing tangible products that are meaningful for their professional development. Theoretically, this study contributes to expanding the study of Project-Based Learning from the context of student learning to the realm of teacher professional development based on published outputs. Practically, this study offers a structured, contextual, and tangible-outcome-oriented training model, which can serve as an alternative for continuously improving teachers' scientific writing competencies.

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Conflicts of Interest

The authors declare no conflict of interest.

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