# Implementation of PJBL Model-Based Teaching Materials in Bilingual Learning Courses in the Elementary School Teacher Education Study Program, State University of Medan

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**Abstract.** The purpose of this study was to determine the form of learning design using ESP-based Bilingual Learning teaching materials oriented to PJBL, to implement ESP-based Bilingual Learning course learning oriented to PJBL in achieving OBE, to determine the effect of Bilingual Learning teaching materials on student learning outcomes. This type of research is a Mixed Research method (MMR). There are two main stages in this study, namely the qualitative research implementation stage and continued with the quantitative research stage. This research is located in the Elementary School Teacher Education (PGSD) Study Program, at the State University of Medan. The research population was all students of the 2022 intake. The sampling technique in this study was random. This study obtained the expected results. There was an increase in student learning outcomes after being taught using PJBL-based teaching materials. Based on the results of the hypothesis test, it was concluded that the teaching materials had a significant effect on the learning outcomes of PGSD Study Program students in the Bilingual Learning course.

**Keywords:** Bilingual, PJBL, Teaching Materials, OBE.

## 1 Introduction

English is a language that must be learned by all levels of education. Starting from kindergarten to college. One of the important reasons for learning English is because English is an international language, in other words English is a means of communication for all people from all countries.

The need for the ability to use English in the learning and teaching process is the basis for the PGSD Department of Medan State University to produce two courses that focus on developing the English skills of students who in the future will become teachers at the Elementary School Education level. These courses are English and Bilingual Learning courses. English courses at the PGSD Department of Unimed focus on learning English grammar in general, while Bilingual learning courses focus on improving students' abilities in implementing the use of English as the main language in the teaching and learning process.

Bilingual learning in elementary schools in Indonesia has become an essential component of the nation's education system, particularly as Indonesia increasingly recognizes the importance of English proficiency in the globalized world. As Indonesia's education system strives to balance local languages, Indonesian (Bahasa Indonesia), and English, bilingual programs aim to support students in acquiring linguistic competence in both languages. Research indicates that early exposure to bilingual education enhances cognitive development and academic performance, particularly in literacy and numeracy, as students navigate between languages and cultures

Currently, the government through the Ministry of Education and Culture recommends the implementation of the Outcome Based Learning (OBE) curriculum. OBE is an approach that emphasizes the sustainability of the learning process in an innovative, interactive and effective way.[1].OBE is considered capable of answering the problem of HR qualifications in the era of globalization because of its emphasis on how students have mastery of competencies in aspects of knowledge, skills, and attitudes according to social, economic, and academic cultural conditions [2]. PJBL's emphasis on collaborative problem-solving and hands-on learning aligns well with the goals of bilingual education, where students must navigate the challenges of learning a new language while mastering subject content. Recent studies have shown that PJBL encourages students to use language as a tool for learning, fostering both linguistic competence and subject knowledge.

Outcome-Based Education (OBE) has become a widely adopted framework in higher education, including teacher education programs. OBE emphasizes clear, measurable learning outcomes that guide curriculum design and assessment, ensuring that students acquire the necessary knowledge and skills to meet specific educational goals. Outcome-Based Education (OBE) is a pedagogical model that requires restructuring of curriculum, pedagogy and assessment practices to reflect high-level learning achievements, which are different from mere accumulation of learning credits. Outcome-based education is a learner-centered approach to education that focuses on what students should be able to do in the real world after completing their courses or programs. Learning outcomes are complex statements of key skills, knowledge, attitudes, abilities, and competencies that students will "have" at the end of learning. Students must achieve their goals at the end of the education process [3]. The project-based learning (PJBL) model according to Katawazai[4] is a learning model that involves a project in the learning process. The project method is a way of teaching that provides opportunities for students to use everyday life units as their learning materials. The aim is for students to be interested in learning. The word project itself comes from Latin, namely projectum which means purpose, design, plan. Wahyudi[5] stated that Project based learning itself is a learning approach that gives students the freedom to plan learning activities, carry out projects collaboratively, and ultimately produce work products that can be presented to others. Based on these two opinions, the proposer argues that the material that is suitable to be taught using is material that is effectively delivered face to face, for example Speaking and listening materials.

Teaching materials refer to any resources, tools, or content used in the educational process to help students understand and master the competencies expected of them. These materials can take various forms, such as textbooks, modules, practical guides, worksheets, audiovisual media, or educational software. In the context of higher education, teaching materials serve as a bridge between theoretical knowledge and practical application, providing students with the necessary resources to connect the learning process with real-world scenarios. Therefore, well-designed teaching materials not only assist in delivering content clearly but also create a more engaging and comprehensive learning experience for students.

The creation of high-quality teaching materials is crucial for improving student learning outcomes for several key reasons. First, well-structured teaching materials can simplify complex concepts by presenting them in an organized and systematic manner. When materials are structured logically and use language that is easy to understand, students can follow the learning process more effectively and reduce confusion regarding difficult topics. Second, well-designed materials can increase student motivation to learn. Teaching resources that are engaging and relevant to students' lives encourage them to become more involved in the learning process. This, in turn, stimulates curiosity and the desire to explore the subject matter in greater depth.

Moreover, good teaching materials support the development of students' critical thinking and creativity. By including case studies, projects, or challenging tasks, students are encouraged to think more deeply and independently in finding solutions. These skills are essential in producing graduates who are not only knowledgeable but also prepared to tackle real-world problems that require analytical and creative thinking. Finally, effective teaching materials also serve as valuable tools for assessment. By incorporating well-structured assignments and quizzes, instructors can evaluate students' understanding of the material and provide constructive feedback.

The teaching materials for the Billingual learning course that are in accordance with the needs of students and work targets have been developed by the proposer in the 2023 research. The teaching materials were developed using the EDDIE Model. The output of the research is teaching materials consisting of textbooks, RPS and assessment instruments. The ESP-based and PJBL-oriented Billingual Learning course textbook consists of 16 Chapters.

The explanation above shows that the author is interested in testing the ESP-based Bilingual Learning teaching materials oriented to PJBL in the learning of the "Billingual Learning" course in the OBE curriculum era. This research will also produce a learning tool such as RPS and learning media that have the achievements that OBE expects.

## 2    Research Method

The type of research used is Mixed Method Research (MMR). MMR is a research method that is applied when researchers have questions that need to be tested in terms of outcomes and processes, and involves a combination of quantitative and qualitative methods in one study. Because it focuses on outcomes and processes. Creswell and Clark define MMR as a research design that departs from the philosophical assumptions of the inquiry method. As a methodology, MMR provides guidance when collecting and analyzing data and mixing between the two approaches is carried out during the research process. The MMR design used in this study is the Exploratory Design. According to Creswell John, exploratory design is carried out in two phases or sequential designs - qualitative data that has been obtained first, then continued with the quantitative phase. In this design, the results of qualitative data analysis are used to help determine the focus and type of data collection in the quantitative phase [6].

The population in this study were all students of the 2022 intake who took the Bilingual Learning course. Furthermore, to obtain samples in this research proposal, the proposer used a non-random sampling technique. In this study, the author determined class A PGSD 2022 as many as 30 students to be the sample in this study.

Data analysis in this study is qualitative and quantitative. For qualitative data analyzed using qualitative descriptive analysis techniques and for quantitative data, researchers

conducted validity, reliability, normality tests and ended with a Hypothesis test using a paired t-test.

# 3   Results and Discussion

## 3.1   Implementation of Bilingual Learning Materials Based on PJBL in the PGSD Department, State University of Medan.

### 3.1.1  College Preparation

The lecturer began by introducing the concept of bilingual learning and Project-Based Learning (PBL) to the PGSD students. A detailed explanation was given about the learning objectives, expectations, and assessment system that would be implemented during the semester. Students were divided into project groups, taking into account the diversity of English language abilities to ensure effective collaboration.

To measure students' initial English ability, a pre-test was conducted. In addition, a survey of students' interests and experiences in bilingual learning was conducted to understand their background and learning needs.

### 3.1.2  Implementation of Learning

Lecturers present topics and driving questions in Indonesian and English. Students brainstorm project ideas using bilingual techniques, developing critical thinking skills in two languages. Project plans are developed using bilingual templates, introducing students to planning learning design projects in elementary schools using bilingual. Students carry out projects using sources in Indonesian and English, improving reading and analysis skills in both languages. Bilingual reading strategies are applied for comprehension of complex texts. Mini workshops on bilingual research and documentation techniques are held to equip students with the necessary academic skills. Next, students draft products (reports, presentations, artifacts) in bilingual formats, applying language skills in academic contexts. Bilingual consultation sessions with lecturers are held to provide guidance. Peer reviews using bilingual rubrics are conducted to improve evaluation and feedback skills.

Project Presentation The project results are presented in a bilingual format, practicing presentation skills in two languages. Q&A sessions are conducted in Indonesian and English, improving oral communication skills. Evaluation and feedback from lecturers and peers are provided for further improvement.

### 3.1.3  Assessment and Evaluation

The achievement of learning objectives is evaluated through the analysis of pre-test and post-test results, measuring the improvement of students' language skills. The impact of the PjBL approach on student motivation and engagement is assessed to understand the effectiveness of the learning model and materials. Evaluation of bilingual communication skills is carried out through presentations and interviews, assessing students' abilities in using English in learning in Elementary Schools. Students are also asked to create podcasts or videos of

Learning in Bilingual Elementary Schools as part of the evaluation of skills in using bilingual languages for both teaching media and learning practices in Elementary Schools. Videos or podcasts are uploaded to the youtube.com page.

## 3.2 Effectiveness of Implementation of Bilingual Learning Materials Based on ESP Oriented to PJBL in the PGSD Department, State University of Medan.

The researcher conducted an implementation test by conducting learning to 30 students who were the samples in this study. The 30 samples were then called the experimental group and were given an initial test (pretest) to determine the initial bilingual abilities of students in the subjects of Science, Mathematics, PPKN, Arts and Culture, and Physical Education. Furthermore, students were given learning using ESP-based Bilingual Learning Materials oriented to PJBL. After being given learning, students were given a final test (posttest) to determine the increase in students' bilingual abilities in the targeted subjects after being given learning. The results of the test will be explained as follows:

A. Pre-test Results

The pre-test results on 30 students obtained the highest score = 82, the lowest score = 46, the average score (M) = 63.87, Standard Deviation (SD) = 10.12. The pre-test score data of students can be seen in table 1 and the frequency distribution data can be seen in table 2 below.

**Table 1.** Student Pre-test Results

| No | Sample | Elementary School Teaching Materials | | | | | Total Value |
|----|--------|------|------|------|------|------|------|
| | | A | B | C | D | E | |
| 1 | AP | 12 | 13 | 11 | 10 | 10 | 56 |
| 2 | BS | 10 | 10 | 11 | 12 | 9 | 52 |
| 3 | CD | 14 | 13 | 16 | 11 | 10 | 64 |
| 4 | DP | 10 | 16 | 14 | 16 | 12 | 68 |
| 5 | EP | 12 | 16 | 12 | 14 | 10 | 64 |
| 6 | FR | 16 | 15 | 18 | 16 | 15 | 80 |
| 7 | GN | 10 | 9 | 11 | 12 | 10 | 52 |
| 8 | HW | 16 | 13 | 11 | 14 | 10 | 64 |
| 9 | IP | 18 | 15 | 16 | 17 | 16 | 82 |
| 10 | JS | 10 | 13 | 9 | 12 | 8 | 52 |
| 11 | KS | 12 | 13 | 13 | 11 | 15 | 64 |
| 12 | LH | 14 | 13 | 17 | 15 | 17 | 76 |
| 13 | MA | 10 | 10 | 11 | 8 | 9 | 48 |
| 14 | NA | 11 | 16 | 13 | 11 | 9 | 60 |
| 15 | OR | 15 | 13 | 14 | 19 | 15 | 76 |
| 16 | PP | 10 | 13 | 16 | 11 | 14 | 64 |
| 17 | QA | 11 | 13 | 11 | 12 | 9 | 56 |
| 18 | RA | 16 | 13 | 16 | 19 | 16 | 80 |
| 19 | SD | 16 | 13 | 11 | 17 | 11 | 68 |
| 20 | TTH | 12 | 13 | 11 | 11 | 9 | 56 |
| 21 | UD | 16 | 13 | 18 | 14 | 11 | 72 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 22 | VA | 14 | 13 | 16 | 16 | 17 | 76 |
| 23 | WW | 12 | 13 | 11 | 15 | 9 | 60 |
| 24 | XB | 16 | 16 | 17 | 19 | 16 | 84 |
| 25 | YS | 16 | 13 | 11 | 18 | 10 | 68 |
| 26 | ZA | 16 | 13 | 11 | 15 | 9 | 64 |
| 27 | AK | 12 | 13 | 11 | 11 | 9 | 56 |
| 28 | BS | 14 | 13 | 13 | 11 | 9 | 60 |
| 29 | CY | 16 | 17 | 16 | 12 | 15 | 76 |
| 30 | DY | 16 | 13 | 11 | 15 | 9 | 64 |
| | | $\sum X$ | | | | | 1916 |
| | | Average | | | | | 63.87 |

Information:
A : Natural and Social Sciences (IPAS)
B : Mathematics
C : PPKN
D : Arts and Culture
E: PHYSICAL EDUCATION

**Table 2.** Frequency Distribution of Pre-test Scores

| Class | Class Interval | Absolute Frequency | Relative Frequency (%) |
|---|---|---|---|
| 1 | 46 – 52 | 3 | 10 |
| 2 | 53 – 58 | 5 | 17 |
| 3 | 59 – 64 | 9 | 30 |
| 4 | 65 – 70 | 4 | 13 |
| 5 | 71 – 76 | 5 | 17 |
| 6 | 77 – 82 | 3 | 10 |
| 7 | 83 – 88 | 1 | 3 |
| | | 30 | 100 |

The pre-test frequency distribution data for the experimental class can be described based on the predetermined interval classes and the observation frequencies obtained from the research are shown in Figure 1 below.
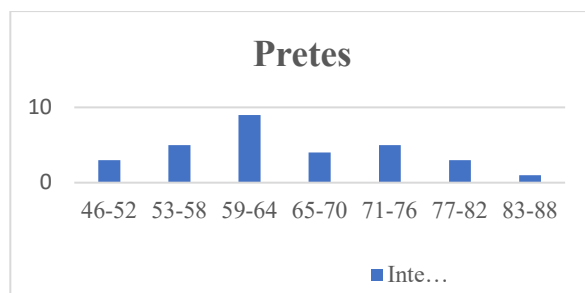
**Fig. 1.** Interval Diagram of Pretest Results

The interval diagram above shows that there are 7 classes of Student value intervals. There are 3 students who get the minimum score, namely in the class range of 46-52, then in the middle score, namely the range of 59-64, there are 9 students and there is 1 student who is in the interval of 83-88 which is the highest score range in the pre-test in this study.

B. Post-Test Results

The post-test results on 30 students obtained the highest score = 90, the lowest score = 58, the average score (M) = 78.6, and the Standard Deviation (SD) = 9.25. The post-test score data for students can be seen in Table 3 and the frequency distribution in Table 4.

**Table 3.** Student Post-test Results

| No | Sample | Elementary School Teaching Materials | | | | | Total Value |
| | | A | B | C | D | E | |
|---|---|---|---|---|---|---|---|
| 1 | AP | 12 | 19 | 11 | 16 | 18 | 76 |
| 2 | BS | 13 | 15 | 14 | 20 | 10 | 72 |
| 3 | CD | 20 | 19 | 13 | 20 | 11 | 83 |
| 4 | DP | 20 | 18 | 20 | 16 | 16 | 90 |
| 5 | EP | 14 | 16 | 15 | 19 | 20 | 84 |
| 6 | FR | 16 | 14 | 15 | 16 | 12 | 73 |
| 7 | GN | 16 | 16 | 18 | 12 | 15 | 77 |
| 8 | HW | 16 | 20 | 19 | 18 | 18 | 91 |
| 9 | IP | 18 | 16 | 12 | 14 | 16 | 76 |
| 10 | JS | 11 | 15 | 18 | 20 | 20 | 84 |
| 11 | KS | 17 | 16 | 11 | 12 | 16 | 72 |
| 12 | LH | 14 | 20 | 17 | 15 | 18 | 84 |
| 13 | MA | 20 | 17 | 19 | 15 | 20 | 91 |
| 14 | NA | 17 | 16 | 17 | 16 | 11 | 77 |
| 15 | OR | 15 | 18 | 16 | 19 | 20 | 88 |
| 16 | PP | 20 | 14 | 12 | 11 | 15 | 72 |
| 17 | QA | 13 | 16 | 19 | 20 | 16 | 84 |
| 18 | RA | 17 | 20 | 16 | 19 | 19 | 91 |
| 19 | SD | 17 | 18 | 20 | 18 | 15 | 88 |
| 20 | TTH | 16 | 13 | 14 | 11 | 18 | 72 |
| 21 | UD | 16 | 17 | 18 | 14 | 16 | 81 |
| 22 | VA | 14 | 13 | 20 | 20 | 20 | 87 |
| 23 | WW | 16 | 18 | 11 | 17 | 11 | 73 |
| 24 | XB | 16 | 16 | 12 | 15 | 10 | 69 |

| 25 | YS | 20 | 18 | 19 | 20 | 14 | 91 |
| 26 | ZA | 20 | 14 | 17 | 19 | 10 | 80 |
| 27 | AK | 12 | 16 | 11 | 11 | 11 | 61 |
| 28 | BS | 16 | 16 | 13 | 18 | 10 | 73 |
| 29 | CY | 20 | 20 | 18 | 12 | 18 | 88 |
| 30 | DY | 20 | 17 | 18 | 17 | 16 | 88 |
| | ∑X | | | | | | 2358 |
| | Average | | | | | | 78.6 |

**Table 4.** Frequency Distribution of Students' Post-test Scores

| Class | Class Interval | Absolute Frequency | Relative Frequency (%) |
|---|---|---|---|
| 1 | 58 – 63 | 1 | 3.33 |
| 2 | 64 – 69 | 1 | 3.33 |
| 3 | 70 – 75 | 7 | 23.33 |
| 4 | 76 – 81 | 6 | 20.00 |
| 5 | 82 – 87 | 5 | 16.67 |
| 6 | 88 – 93 | 10 | 33.33 |
| | | 30 | 100 |

The distribution of post-test frequencies of the experimental class can be described based on the predetermined interval classes and the observation frequencies obtained from the research are shown in Figure 2 below.
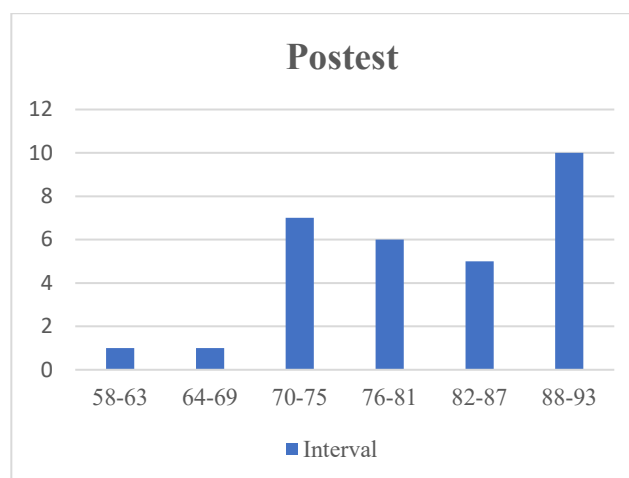


**Fig. 2.** Posttest result interval diagram

Figure 2 shows that there are 6 classes of Student value intervals. There is 1 Student who gets a minimum score, namely in the class range of 58-63, then in the middle score, namely the range of 76-81, there are 6 Students and there are 10 Students who are in the interval of 88-93 which is the highest score range in the post-test in this study. When compared with the pre-test score, the comparison of Student scores is clearly visible where during the pre-test the lowest Student score was 46 then the post-test was 58, then the highest Student score in the pre-test was 84 and in the post-test the highest score was 91.

## C. Normality Test

Normality test was conducted on two groups of data: Pretest and Posttest. The Pretest and Posttest groups consisted of 30 samples. To test the normality of the data, two methods were used: Kolmogorov-Smirnov and Shapiro-Wilk. The results of the normality test are shown in Table 5 below.

**Table 5.** Normality Test Results

| | Class | Kolmogorov-Smirnova | | | Shapiro Wilk | | |
|---|---|---|---|---|---|---|---|
| | | Statistics | df | Sig. | Statistics | df | Sig. |
| Results | Pretest | ,156 | 30 | ,060 | ,953 | 30 | ,208 |
| | Posttest | ,334 | 20 | ,053 | ,577 | 20 | ,430 |
| a. Lilliefors Significance Correction | | | | | | | |

The test results for the Pretest showed a normal distribution. The Kolmogorov-Smirnov test produced a significance value of 0.060, while the Shapiro-Wilk test produced a significance value of 0.208. Both of these values are greater than 0.05, indicating that the Pretest data is normally distributed.

The results of the normality test for the Posttest data also show a normal distribution. The Kolmogorov-Smirnov test produces a significance value of 0.051, which is slightly above the threshold of 0.05. The Shapiro-Wilk test produces a significance value of 0.430, which is also greater than 0.05. Both of these results indicate that the Posttest data is normally distributed.

## D. T-test

Simple linear regression analysis shows the relationship between the teaching materials of the ESP-Based Bilingual Learning course Oriented to PjBL (independent variable/X1) and the learning outcomes of students' bilingual learning courses (dependent variable). The t-test results table is shown in Table 6 below.

**Table 6.** T-Test Results

| Coefficientsa | | | | | | | |
|---|---|---|---|---|---|---|---|
| Model | | Unstand. Coeff. | | Coeffi Stand | t | Sig. | Coll. Stats. | |
| | | B | Std. Error | Beta | | | Toll. | VIF |
| **1** | Const | 5,796 | 1,039 | | 5,580 | .000 | | |
| | X1 | ,015 | ,076 | ,0537 | 5,461 | .000 | 1,000 | 1,000 |
| a. Dependent Variable: ABS_RES | | | | | | | | |

The regression model produces a constant value of 5.796 with a standard error of 1.039. The regression coefficient for the teaching material variable (X1) is 0.015 with a standard error of 0.076, and the standardized Beta coefficient is 0.537.

The results of the significance test showed a t-value of 5.461 with a significance value of 0.000 (p <0.05), which means that there is a significant influence of the use of teaching materials for the ESP-based Bilingual Learning course Oriented to PjBL on the learning outcomes of students' bilingual learning courses. Thus, it can be concluded that the teaching materials for the ESP-based Bilingual Learning course Oriented to PjBL provide a positive and significant contribution in improving the learning outcomes of the bilingual learning course.

The main findings of the study revealed the effectiveness of bilingual project-based learning in developing the competencies of prospective elementary school teacher students [7]. Larmer & Mergendoller confirmed that the project-based learning approach significantly increased student engagement and in-depth understanding [8].

The bilingual approach has been proven to improve students' English language skills contextually [9]. Recent research shows that English for Specific Purposes (ESP) is effective in developing language skills in specific professional contexts [10].

Integration of Outcome-Based Education (OBE) focuses on achieving real competencies. Recent studies emphasize that OBE encourages the transformation of knowledge into practical skills. Research challenges include variations in students' initial abilities. Current theories emphasize the importance of scaffolding to address individual differences in learning.


# 4    Conclusion

This research investigates the implementation of PJBL-based teaching materials in bilingual learning courses within the Elementary School Teacher Education Study Program at the State University of Medan. The study will explore how these materials can be developed and integrated into the curriculum to foster bilingual competence and pedagogical skills among pre-service teachers. By examining the intersection of PJBL and OBE in a bilingual learning context, this research seeks to contribute to the growing body of literature on the effectiveness of project-based learning and outcome-based education in bilingual teacher preparation programs.

Implementation of Bilingual Learning Materials Based on ESP Oriented to PJBL has been applied in the PGSD Department of Medan State University. The results of the normality test showed that the data were normally distributed, which allowed for further parametric analysis. The results of the significance test showed a t-value of 5.461 with a significance value of 0.000 (p <0.05), which means that there is a significant influence of the use of Bilingual Learning Materials Based on ESP Oriented to PjBL on the learning outcomes of students' bilingual learning courses. Implementation of Bilingual Learning Materials Based on PJBL shows potential in improving students' learning outcomes in the bilingual learning course, but requires further adjustments and improvements to optimize its effectiveness for all students.

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