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# Comparing Problem-Based Learning (PBL) and Active Learning in Augmenting Students' Proficiency in Reading Comprehension

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**Abstract: Comparing Problem-Based Learning (PBL) and Active Learning in Augmenting Students' Proficiency in Reading Comprehension. Objective:** To compare the influence of the PBL Model and the Active Learning Model on students' understanding of BIPA learning method material. **Method:** This research uses experimental methods and a quasi-experimental research design. A two group pretest-posttest research design was used for this study. Using purposive sampling technique, the sample for this investigation was selected from two classes. This research's data collection approach requires administering tests. SPSS is a software application used for statistical data analysis. Active Learning and PBL influence students' reading comprehension of lesson material, according to the findings of this research. **Findings:** Based on testing the two models, the results showed that the average learning outcomes of students who used the Active Learning model could not be differentiated from those of students who used the PBL model. **Conclusion:** The results of the SPSS analysis of the N-gain Score show that both the PBL and Active Learning models are very effective in improving students' reading comprehension of the subject matter.

**Keywords:** Problem based learning, active learning, reading comprehension.

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## INTRODUCTION

Accessing and conveying information from the past to the present is generally done through reading and writing methods (Ozok & Çelîk, 2022). To carry out effective social interactions, individuals need basic reading and writing skills (Jacob & Pillay, 2022). Mastering reading and writing skills is important as a prerequisite for achieving the desired level of knowledge and disseminating that knowledge effectively to the surrounding environment (Ozok & Çelîk, 2022). Therefore, to understand and extract information from texts, reading ability is essential for students. Along with the development of cognitive and communicative techniques, reading comprehension is now considered an active information processing ability, where readers relate the text to the knowledge they have and make conclusions obtained from the text (Alshammari, 2022). Reading acts as a tool to stay informed about the latest developments and improve an individual's understanding of the world (Ocak & Karslý, 2022).

It is not sufficient to decode successive letters, words, and sentences in order to fully comprehend the text; this is not the essence of reading (Bojovic, 2010). Engaging in reading entails the integration of diverse knowledge

sources, encompassing both lexical attributes and current global affairs (Alotaibi, 2022). The act of reading is a dynamic undertaking wherein both the reader and the reading material make an effort to construct meaning (Alshaye, 2021). Numerous cognitive processes must be executed and integrated for this to occur (Kendeou et al., 2014). Hence, reading can be conceptualized as a process of constructing meaning through the integration of information from linguistic, semantic, visual, and conceptual sources to decipher the significance of phrases and sentences (Yang et al., 2022).

We currently do not receive and apply information in its literal form. The generation and dissemination of information require individuals, while readers are anticipated to engage in critical analysis of texts with inquisitive and evaluative mindsets (Ocak & Karslý, 2022). Reading is a fundamental skill that enables individuals to acquire a substantial amount of knowledge over the course of their lives (Arslan, 2022). While reading proficiency is associated with perceptual abilities, it is not restricted to these particular faculties. Perceptual, physical, and psychological abilities are necessary for this (Nosich, 2015).

Reading is an indispensable ability. Coordinating the diversity of numerous abilities, strategies, skills, and knowledge are these competencies (Gül & Ozdemir, 2021). The principal objective of reading is to comprehend and extract information from a given text (Alshammari, 2022). University students must possess reading comprehension as a fundamental academic competency (Alreshoud & Abdelhalim, 2022). Success in the majority of academic disciplines is determined by a student's capacity to read, comprehend the material, and subsequently apply it to future learning (Bastug, 2014). In order to foster critical thinking and facilitate comprehension of intricate texts, it is imperative that educators and learners alike implement effective reading comprehension strategies (Alghonaim, 2020).

In the realm of language education, reading has been the subject of extensive research (Yang et al., 2022). Historically, instructing pupils on the identification, comprehension, analysis, and correlation of significant concepts within texts (Ulutaº & Kaya, 2023). Difficulties arise when pupils fail to comprehend the material and provide inadequate responses to reading comprehension inquiries or provide incorrect responses (Halim, 2020). Despite being a receptive language ability, reading is a particularly challenging one for students to master. A minority of students continue to encounter challenges comprehending the material presented in the readings, thereby impeding their scholastic progress. To surmount this challenge, it is imperative to implement suitable pedagogical approaches that enhance students' literacy proficiencies.

In the classroom, learning models that maximize mastery of conceptual knowledge are crucial to the educational process. The utilization of a learning model constructed according to the constructivist methodology is deemed suitable (Simanjuntak et al., 2021). An educational framework that adheres to this tenet is Problem Based Learning (PBL). Problem-Based Learning (PBL) is an inventive pedagogical approach that facilitates student engagement and aids in the resolution of tangible challenges by means of ongoing participation (Mustofa & Hidayah, 2020). Plaguing beyond lower levels of cognition (remember and comprehend) towards higher levels (apply, analyze, evaluate, and create) can be accomplished effectively through the use of PBL (Mustofa & Hidayah, 2020). Students' cognitive strategies and academic performance are enhanced by this model (Marthaliakirana et al., 2022). A positive correlation has been observed between metacognitive processes and academic achievement (Mohseni et al., 2020; Syaiful, Huda et al., 2022).

The learning process is enhanced when PBL is implemented (Waite et al., 2020). Students gain numerous general competencies through the use of this model, including problem solving, negotiation, and communication (Orfan et al., 2021). Students' critical thinking and learning potentials can be enhanced through the implementation of PBL (Deniº-eliker & Dere, 2022; Seibert, 2021). In addition to developing students' social-constructivist principles, PBL can offer invaluable opportunities for lifelong learning through the application of acquired knowledge (Bosica et al., 2021). PBL facilitates self-awareness, or the realization of one's own qualities and assets (Bayram & Deveci, 2022).

PBL management refers to an instructional structure wherein students are assisted in attaining their learning objectives through the utilization of problems (Chaidam & Poonputta, 2022). In order to stimulate discourse among students in small groups, problems ought to be presented; assessment should center on learning outcomes and processes (Ali, 2019; Chaidam & Poonputta, 2022; Theabthueng et al., 2022). Participatory problem-solving (PBL) enables students to execute strategies, explore alternative approaches, employ their intuition, gain advantages from inventive thinking, and utilize their ingenuity (Bayram & Deveci, 2022). PBL is favored by numerous instructors as a pedagogical strategy due to the environment it fosters, which encourages active learning by having students collaboratively construct concepts through social interactions and autonomous study (Sousa & Costa, 2022). In addition to facilitating and motivating students, instructors may offer effective recommendations derived from a variety of learning resources (Ates & Eryilmaz, 2020; Polyiem & Nuangchalerm, 2022).

While attempting to develop higher-order thinking skills through problem-based learning (PBL), students may only consider a restricted amount of subject matter due to a lack of knowledge acquisition and an occasional fixation on problems (Seyhan & Türk, 2022). On the basis of empirical evidence, PBL is a recommended learning model for the Higher Education Curriculum. One of these may be implemented in the "Language Learning Methods" course. This lecture is included in the lecture bundles for BIPA (Indonesian Language for Foreign Speakers). The subject matter examined comprises a variety of educational strategies applicable to BIPA students. In order to be considered successful in this course, students must be capable of distinguishing between and comprehending the fundamental principles underlying each language learning method. Active Learning is an alternative to Problem-Based Learning that is grounded in the Constructivist learning philosophy.

The recent paradigm shift, which converts instruction into learning, requires students to engage actively in the learning process in order to foster inquiry and enhance their problem-solving and analytical skills (Emaliana, 2017). Students are now required to assume a great deal of accountability for their own education due to this transformation (Lee & Hines, 2012). In order to develop self-awareness, learners are motivated to integrate new information gained through interactions with their prior experiences and knowledge (Kulachit & Nuangchalerm, 2021; Rahman et al., 2020). Additionally, they must take an active role in improving their learning processes (Aflah & Rahmani, 2022).

An instance of a student-centered approach that can enhance academic achievement and stimulate student interest is active learning (Harackiewicz et al., 2016). Students who are enthusiastic about the subject matter are more inclined to maintain focus and perseverance during lectures (Karcher et al., 2022). Active learning facilitates student participation, problem-solving,

productivity, and collaboration with peers. Alternatively stated, there is a higher probability that students will acquire superior knowledge when instructed using active learning strategies (Aykan & Dursun, 2022). This learning is frequently a prerequisite for any instructional approach that involves students in meaningful learning activities and self-reflection, so long as they remain engaged in the learning process (Hui et al., 2021).

Active learning, like problem-based learning, is grounded in constructivism and cognition as collaborative partners in the domain of learning (Karcher et al., 2022). The constructivist paradigm posits that individuals acquire environmental knowledge through the process of associating it with pre-existing knowledge (Büyükbayraktar & Dilber, 2022). Active learning is a comprehensive methodology for creating learning environments—both inside and outside of the classroom—in which students can collaboratively and emotionally interact with course material. This learning approach empowers students to actively engage in their own education (Griebel et al., 2022), while also enabling instructors to guide their lessons akin to conductors. Active learning is an instructional approach wherein instructors foster student autonomy and promote the development of a democratic mindset (Aykan & Dursun, 2022). Therefore, interaction between students and between teachers and students is essential for the teaching and learning process (Achmad & Yusuf, 2014). Thus, it is anticipated that educators at all levels of education, including higher education, can facilitate active learning in order to accomplish the intended objectives (Ma, 2021).

Prior studies have established that the implementation of active learning strategies has a positive impact on students' academic performance, motivation to learn, social skills, and learning attitudes (Büyükbayraktar & Dilber, 2022). Hence, students can acquire superior knowledge and instruction by integrating active learning components into lectures while maintaining a steadfast adherence to the lecture paradigm (Church, 2021). As a result, the objective of this study is to compare the effects of the PBL and Active Learning models on students' comprehension of BIPA learning method content.

## METHODS

This study employed experimental methods and quasi-experimental research designs. A two-group pretest-posttest research design was utilized for this study. An experimental design comprising of two groups—pretest and posttest—was implemented, in which students received diverse treatments. Students' pre-treatment (pre-test) performance is evaluated through the administration of a concluding assessment (posttest). Students from the 2020 cohort of the Indonesian language and literature education study program comprise the research population. These pupils were members of five different classes. By employing purposive sampling techniques, samples for this investigation were selected from two classes. This approach of collecting research data entails conducting tests. The assessment maintains objectivity by incorporating inquiries pertaining to BIPA learning strategies. This tool for investigation employs tests. The subsequent procedures outline the process of developing a statistical analysis method for utilizing SPSS 26 to process research data. Conduct a test for data normality initially. Subsequently, evaluate the consistency of the data. Third, conduct a T-test on paired samples. Fourth, compute the N-Gain using the Independent Sample T Test.

**Table 1.** Research design

| Class | Pretest | Treatment | Post-Test |
|---|---|---|---|
| Experiment 1 | O1 | Active Learning | O1 |
| Experiment 2 | O2 | Problem Based Learning | O2 |

## ■ RESULTS AND DISCUSSION

### Result

The research findings were derived from the scores of student reading comprehension skill tests conducted before and after the trial activities in two groups: experimental group 1 and experimental group 2. The research findings can be summarized as follows. Begin by providing an overview of the descriptive statistics derived from the data analyzed using SPSS. Table 2 presents a descriptive statistical analysis of the data in this investigation.

**Table 2.** Descriptive statistic

| | N | Min | Max | Averange | Std. Deviation |
|---|---|---|---|---|---|
| Experiment Class 1 (Pres-test) | 25 | 57 | 84 | 69.48 | 1.23931 |
| Experiment Class 1 (Post test) | 25 | 81 | 95 | 87.20 | 0.70475 |
| Experiment Class 2 (Pres-test) | 25 | 60 | 80 | 68.80 | 0.82260 |
| Experiment Class 2 (Post test) | 25 | 82 | 95 | 88.40 | 0.64807 |

Table 2 reveals that the average learning outcomes in experimental class 1 and experimental class 2 are quite similar. In order to ascertain substantial disparities, it is imperative to conduct statistical analyses on student learning outcomes utilizing SPSS. Next, assess the normalcy of the trial data. The Normality test employed in this study utilized the Shapiro-Wilk test with a significance threshold of 0.05. Once the data has been analyzed using the SPSS software, the resulting output can be observed in Table 3.

**Table 3.** Data normality test

| | Group | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | | Statistic | df | Sig. | Statistic | df | Sig. |
| Pre-test | Active Learning | .152 | 25 | .138 | .953 | 25 | .291 |
| | Problem Based Learning | .168 | 25 | .067 | .928 | 25 | .076 |
| Post test | Active Learning | .098 | 25 | .200* | .976 | 25 | .804 |
| | Problem Based Learning | .131 | 25 | .200* | .968 | 25 | .590 |

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

The results of the Shapiro-Wilk test in table 3 indicate that the score data for the four sets of data have different levels of significance. Specifically, the pre-test data for experimental class 1 has a significance level of 0.291, the pre-test data for experimental class 2 has a significance level of 0.076, the post-test data for experimental class 1 has a significance level of 0.804, and the post-test data for experimental class 2 has a significance level of 0.590. Based on this data, it can be inferred that the data is a sample with a normal distribution and a

significance level greater than 0.05. Based on the presentation of the significant data, it can be inferred that both the pre-test and post-test data in both classes are samples that follow a normal distribution. Next, assess the uniformity of the trial data. The Homogeneity Test is conducted to see if the two populations originate from the same variance. The homogeneity test in this study employed the Levene test, utilizing the SPSS software package. Table 4 displays the outcomes of the homogeneity test.

**Table 4.** Data homogeneity test

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Pre-test | Based on Mean | 3.726 | 1 | 48 | .060 |
| | Based on Median | 3.058 | 1 | 48 | .087 |
| | Based on Median and with adjusted df | 3.058 | 1 | 39.498 | .088 |
| | Based on trimmed mean | 3.609 | 1 | 48 | .063 |
| Post test | Based on Mean | .136 | 1 | 48 | .714 |
| | Based on Median | .120 | 1 | 48 | .731 |
| | Based on Median and with adjusted df | .120 | 1 | 47.682 | .731 |
| | Based on trimmed mean | .125 | 1 | 48 | .725 |

According to the data in table 4, the significance values for the average pretest and posttest data are 0.060 and 0.714, respectively. Since these values are more than the significance level or probability value of 0.05, it may be concluded that the population has the same or homogeneous variance. Next, we will conduct a Paired Sample T Test. This test is utilized to determine if there is a disparity in the averages of two correlated samples. The study utilized the obtained results to determine if there were disparities in learning outcomes following the implementation of the Active Learning and PBL models. The Paired Sample T Test was conducted on the Pre-Test data of the experimental class and the Post-Test data of the experimental class (Pair 1 using Active Learning and Pair 2 using PBL) to address this topic. Table 5 displays the outcomes of the trial.

**Table 5.** Paired sample test

| | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Pre-test - Post test | -17.7200 | 6.51613 | 1.30323 | -20.40973 | -15.03027 | -13.597 | 24 | .000 |
| Pair 1 | Pre-test - Post test | -19.6000 | 5.80948 | 1.16190 | -21.99803 | -17.20197 | -16.869 | 24 | .000 |

The Sig value is obtained based on the output of pair 1. The p-value (2-taillet) is 0.000, which is less than 0.005. Therefore, we can infer that there is a significant difference in the average student learning outcomes for experimental class 1. From the output pair 2, the significance value (2-tailed) of 0.000 < 0.005 indicates that there is a statistically significant difference in the average student learning outcomes for experimental class 2. Furthermore, it is necessary to determine if there exists a disparity in the mean values of two independent samples (experimental classes 1 and 2) based on the post-test outcomes. Examination. The primary requirement for this test is that the data follows a normal distribution and is homogenous (not absolute). The study of the normality test and homogeneity test indicates that the data exhibits normal distribution and homogeneity. The findings of the mean difference analysis in this investigation presented in Table 6.

**Table 6.** Independent sample t-test

| | | **Levene's Test for Equality of Variances** | | **t-test for Equality of Means** | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | **95% Confidence Interval of the Difference** | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Post test | Equal variances assumed | .136 | .714 | -1.253 | 48 | .216 | -1.20000 | .95743 | -3.12504 | .72504 |
| | Equal variances not assumed | | | -1.253 | 47.667 | .216 | -1.20000 | .95743 | -3.12538 | .72538 |

Based on the test results, a sig value was obtained. (2-tailed) is 0.216 > 0.05, so it can be concluded that there is no difference in the average student learning outcomes using the Active Learning model compared to using the PBL model. Sixth, find out the effectiveness of using a learning or treatment model by looking for Normalized gain (N-gain Score). To calculate N-gain, you can use the following formula.

$$\text{N Gain} = \frac{Score\ posttest - score\ pretest}{Ideal\ score - score\ pretest}$$

The research conducted using SPSS indicates that the average N-gain score for experimental class 1, which implemented the Active Learning model, is 56.5757 or 56.6%. This score falls within the category of quite effective, with a minimum N-gain of 25% and a maximum N-gain of 82.76%. On the other hand, the average N-gain score for experimental class 2 (PBL) was 61.7270 or 61.73%, falling inside the category of being quite effective. The lowest N-gain observed was 20%, while the highest N-gain recorded was 82.76%. According to this research, it is evident that the Active Learning and PBL models are highly efficient in enhancing students' reading comprehension in relation to BIPA learning method material. Subsequently, an evaluation was conducted to compare the efficacy disparities between the Active Learning and PBL models. This evaluation employed the

Independent Sample t test for the N-Gain Score with SPSS. Prior to conducting the t test, the normality and homogeneity test of the N-gain score was performed initially. According to the research conducted using SPSS, the N-gain score exhibits a normal distribution and is homogeneous. The research conducted using SPSS indicates that the significance level for the Active Learning percent N-Gain data is 0.646, whereas for the PBL % N-Gain data it is 0.105.

**Table 7.** Independent sample t test (n-gain persen)

| | | **Levene's Test for Equality of Variances** | | **t-test for Equality of Means** | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | **95% Confidence Interval of the Difference** | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| NGain_ Persen | Equal variances assumed | .077 | .783 | -1.353 | 48 | .182 | -5.15134 | 3.80793 | -12.80769 | 2.50502 |
| | Equal variances not assumed | | | -1.353 | 47.739 | .182 | -5.15134 | 3.80793 | -12.80877 | 2.50610 |

From the provided output table, the significance value is determined. The result of Levene's test for equal variances is 0.783, which is greater than the significance level of 0.05. Therefore, we may conclude that the variance of the N-gain data (%) for the two experimental classes is homogeneous. The independent sample t-test is used to compare the n-gain scores, assuming equal variance. The significance value is determined based on the output table of the independent samples test. The p-value of 0.182, obtained from a two-tailed test, is more than the significance level of 0.05. Therefore, we can infer that there is no statistically significant difference in effectiveness between learning using the Active Learning model and Problem Based Learning (PBL).

**Disscussions**

Students' comprehension of the subject matter is impacted by the Active Learning and Problem Based Learning (PBL) instructional models, according to the findings of the research. Furthermore, the analysis demonstrates that both Problem-Based Learning (PBL) and Active Learning are highly effective in enhancing students' reading comprehension of the subject matter. According to prior investigations (Mustafa et al., 2012), it was discovered that students who engaged in active learning strategies improved their reading comprehension performance. Active Learning positively impacts student engagement in the learning process, in addition to enhancing students' reading comprehension skills. This is supported by research (Shorouq Ali Al-Ghamdi & Afrah Hafiz Al-Oweidi, 2021) which discovered that reading skills are among the aspects of language learning that are impacted by active learning. Furthermore, it facilitates greater teacher-student interaction in the classroom, which contributes to the learning experience.

According to Kamarulzaman et al. (2018), acquiring language skills gradually is not possible; therefore, effective learning strategies are necessary, including the implementation of Active Learning. The majority of students have favorable attitudes toward the English language and active learning, according to her research. Additionally, the implementation of active learning strategies can facilitate the development of interpersonal skills and higher order cognitive abilities. Active learning strategies enhanced students' comprehension on three levels of comprehension in favor of the experimental group, according to Al-Magableh et al. (2022). As a result, it can be hypothesized that the implementation of active learning strategies enhances the overall reading comprehension level of students.

Next to be examined is the implementation of PBL in education. In contrast to the limited examination of Active Learning in the context of reading skills, the Problem-Based Learning (PBL) paradigm is widely endorsed at the collegiate and secondary levels, particularly in Indonesia. As a result, numerous literature studies have examined this aspect. According to Marpaung (2016), problem-based learning (PBL) exerts a substantial impact on students' reading comprehension in comparison to the Direct Instruction (DI) approach. The PBL method enhances the engagement and enjoyment of the instruction and learning process. This is due to the fact that it encourages all students to participate actively in every classroom activity. Literal comprehension exhibits the highest level of student achievement in comparison to interpretive comprehension and critical comprehension. Aligned with this, a study (Hasyim, 2021) investigated the efficacy of employing PBL techniques, which are student-centered teaching strategies, to enhance Arabic literacy abilities. The research followed a seven-step methodology. Variations in the development of soft skills, such as empathy, among subjects with advanced reading proficiency levels were identified in the research findings prior to and subsequent to the implementation of teaching strategies.

Syahfutra and Niah (2019) discovered that the implementation of PBL strategies had a substantial impact on the reading comprehension and motivation of students. Problem-Based Learning (PBL) is an approach that facilitates the application of conceptual understanding in practical situations, thereby fostering the development of critical thinking and problem-solving abilities. PBL requires students to identify what they need to learn to solve a problem through collaborative group work. Rosyidin et al. (2022), who conducted additional research, concluded that PBL improves students' comprehension of English reading texts in comparison to the TBL model. Furthermore, English Reading Comprehension scores were higher among students who were exposed to the PBL model incorporating high critical thinking as opposed to those who were exposed to the TBL model incorporating high critical thinking.

Sidik and Masek (2021) assert that proficient reading abilities are undeniably critical for students to succeed academically, particularly in foundational subjects. His research revealed a statistically significant difference in students' reading comprehension, content mastery, and vocabulary mastery through the use of PBL between the experimental group and the control group. Students who participated in PBL learning attained higher performance levels than those who did not, according to the findings of the study. Subsequently, Macadangdang (2019) suggested in his research results that problem-solving, which is a feature of the problem-based model, effectively enhanced students' abilities to recognize critical details, compose summaries, analyze the material, and draw conclusions. text. This demonstrates the students' highly developed reading comprehension. According to some

researchers, PBL enhances students' higher-order thinking and stimulates cognitive processing (Sidik & Masek, 2021). Furthermore, superior cognitive abilities may be regarded as the optimal consequence of ultimate performance outcomes. PBL can be utilized in this manner to enhance the reading comprehension skills of students. Subsequently, Aliyu et al. (2020) detailed in their findings that PBL effectively guided students to develop critical perspectives on discussion topics via collaborative group work. PBL is suggested by Arjuna and Jufri (2016) as an effective method for instructing Reading Comprehension. They did not, however, attempt to demonstrate whether PBL is more effective than alternative models.

## CONCLUSIONS

The Problem-Based Learning (PBL) instructional approach is one of the suggested learning models in the Curriculum for Higher Education. As a result, the vast majority of instructors revise their instructional designs to incorporate this framework. However, diverse models must be utilized during the learning process in accordance with the requirements and subject matter being examined. Active Learning is one model that can be implemented in lieu of this. The underlying philosophical constructivism of this learning model is identical to that of the PBL model. Students' reading comprehension of the subject matter is impacted by both the Active Learning and PBL models, as demonstrated by the results and discussion, which are consistent with the research objectives. An examination of the two models indicates that the average student learning outcomes for those who utilized the Active Learning model are indistinguishable from those who utilized the PBL model. The results of the SPSS analysis of the N-gain Score indicate that both the PBL and Active Learning models are quite effective in enhancing students' reading comprehension of BIPA learning method material, with respective improvements of 56.6% and 61.73% for Active Learning and PBL. In comparison to the Active Learning model, the PBL model exhibits a greater percentage value, as indicated by the values of the two learning models employed.

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