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Problem-Based Learning (PBL)

How does it Affect the Speaking Skills of Introvert and Extrovert Students?

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Abstract

Problem-Based Learning (PBL) fosters student engagement and enhances the learning process through active problem-solving. However, limited research has explored its specific impact on the speaking skills of students with varying personality traits. This study investigates the influence of PBL on the speaking proficiency of introverted and extroverted students at Fatmawati Sukarno State Islamic University, Bengkulu. Using a comparative experimental design, 40 students were categorized as introverts or extroverts based on a validated personality questionnaire. PBL was implemented through structured group activities, including identifying real-world problems, researching solutions, brainstorming ideas, and presenting findings. These tasks targeted critical speaking skills such as fluency, confidence, organization, and clarity. Pre-test and post-test assessments of speaking performance provided quantitative data, analyzed using paired and independent t-tests. Results revealed significant

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improvements in speaking proficiency for both groups, with extroverted students showing greater gains than their introverted peers. The findings highlight the potential of PBL to improve speaking skills across personality types and underscore the importance of tailoring PBL activities to accommodate diverse learner traits. This study contributes to the literature by demonstrating the adaptability of PBL for optimizing speaking skill development in higher education contexts.

Keywords: Problem-based learning; Speaking skills; Personality traits; Introverted students; Extroverted students

Introduction

Teaching methods play a very important role in shaping the learning process by creating environments that promote academic growth and equip students with the skills needed for lifelong learning. Effective instructional approaches not only inspire learners but also enable them to achieve specific educational goals. As Jeronen et al. (2016) describe, teaching methods are structured processes facilitating knowledge exchange between educators and students, with the ultimate aim of fostering meaningful changes in learning outcomes.

Among various instructional strategies, Problem-Based Learning (PBL) has gained prominence as a dynamic approach to education. Hmelo-Silver (2004) characterizes PBL as a method that engages students in solving authentic, real-world problems, integrating knowledge across disciplines to develop critical thinking, adaptability, and informed decision-making. The emphasis on practical application makes PBL particularly relevant in English Language Learning (ELL), where developing both linguistic proficiency and real-world communication skills is paramount.

Extensive research underscores the benefits of PBL in enhancing speaking proficiency and cultivating positive attitudes toward ELL. For instance, Hasnawan (2020) found that PBL improves students' speaking skills and fosters cognitive, behavioral, and emotional engagement. However, studies like Nurhazizah et al. (2022) present mixed results, attributing limited success to contextual factors such as implementation techniques and learner participation. Despite these inconsistencies, Sutrisna and Artini (2020) highlight the value of PBL in promoting speaking proficiency and fostering a favorable attitude toward language learning.

In addition to instructional methods, individual learner differences, particularly personality traits, significantly influence language acquisition. Ellis

(1994) proposed that extroverts, with their inclination for interpersonal communication, often excel in spoken language, while introverts, known for their reflective and cognitive strengths, may perform better in structured tasks. Understanding how personality traits interact with instructional methods like PBL is crucial for designing inclusive and effective learning experiences.

Emerging studies suggest that PBL supports the development of essential social-emotional skills and fosters independence, creativity, and critical thinking. For example, Fitzgerald (2020) and Morrison et al. (2021) emphasize how PBL nurtures interpersonal and cognitive abilities. Wu et al. (2019) further examine the interplay between personality traits and communication behaviors in web-based learning environments, reinforcing the need for personalized teaching strategies.

Despite the growing body of research on PBL and its general benefits, the specific impact of PBL on speaking proficiency among learners with different personality traits—introverts and extroverts—remains underexplored. This gap limits the ability of educators and curriculum developers to design tailored interventions that maximize learning outcomes for diverse student populations. Addressing this gap, the present study investigates how PBL influences the speaking skills of introverted and extroverted students at Fatmawati Sukarno State Islamic University, Bengkulu.

The study employs a comparative experimental design to evaluate the nuanced effects of PBL on these distinct personality groups. By bridging theoretical insights and practical applications, the research seeks to advance personalized learning strategies in language education. The findings are expected to inform educators and curriculum designers, enabling them to develop more inclusive and impactful PBL interventions. The research is guided by the following question:

- How does the implementation of a Problem-Based Learning (PBL) model influence the speaking skills of students with different personality traits (introverts vs. extroverts)?

Literature review

Overview of Problem-Based Learning (PBL)

Problem-Based Learning (PBL) has emerged as a dynamic educational methodology that fosters active student engagement in meaningful problem-solving. This approach allows students to collaboratively address problems, develop mental models for understanding, and cultivate self-directed learning

habits through hands-on experiences and reflective practices (Evensen & Hmelo-Silver, 2000; Norman & Schmidt, 1992; Hmelo-Silver, 2004).

The appeal of PBL lies in its alignment with educational goals that prioritize active and collaborative learning. Grounded in the belief that knowledge is constructed and co-constructed through social interactions and self-directed inquiry, PBL provides a robust framework for fostering deeper learning (Glaser & Bassok, 1989). By emphasizing the application of knowledge to real-world scenarios, PBL also encourages learners to develop problem-solving and critical thinking skills that extend beyond the classroom.

The decision to prioritize PBL in this review stems from its relevance to contemporary educational practices and its demonstrated potential to enhance learners' engagement and autonomy. Understanding PBL's theoretical foundations and practical applications is vital for contextualizing its role in improving language education and student outcomes.

Insights into Speaking Skills

Speaking skills have long been a central focus in language acquisition research, with various theoretical frameworks offering insights into their development. Behavioral Theory, for instance, posits that speaking skills are acquired through imitation and reinforcement, emphasizing the role of feedback in shaping learners' speech (Skinner, 1957). Nativist Theory, on the other hand, highlights the innate capacity for language acquisition, suggesting that speaking ability is an inherent aspect of human cognition (Chomsky, 1965; Litchfield & Lambert, 2011).

Adding to these perspectives, Semantic-Cognitive Theory stresses the importance of meaning in language development. It argues that learners acquire speaking skills by understanding word and phrase meanings, using this knowledge to construct coherent sentences (Piaget, 1981; Dasen, 1994; Wadsworth, 2004). Finally, Social-Pragmatic Theory focuses on the social and cultural dimensions of language, asserting that speaking skills emerge as learners internalize the norms and conventions of effective communication in specific contexts (Vygotsky, 1978; Tomasello, 2005).

Proficiency in speaking is a key indicator of success in language acquisition, often serving as a measure of learners' practical language abilities (Brown & Yule, 1983). This section highlights the significance of speaking skills in English as a second language (ESL) contexts, where achieving fluency is a crucial goal. The inclusion of these theories is intentional, as they provide a comprehensive foundation for examining the multifaceted nature of speaking proficiency.

Personality Concepts in Language Learning

Personality traits are increasingly recognized as influential factors in second language acquisition. Research suggests that learners' personality characteristics can either facilitate or impede language learning, shaping their strategies and outcomes (Zhang, 2008). Specifically, two contrasting hypotheses highlight the role of extroversion and introversion in language learning (Ellis, 1994).

The first hypothesis posits that extroverts excel in acquiring basic interpersonal communication skills due to their sociable nature and willingness to engage in conversations. Conversely, the second hypothesis suggests that introverts may outperform extroverts in academic language learning contexts because of their reflective and analytical approach (Richards & Schmidt, 2013). These perspectives underscore the complex interplay between personality and language learning, emphasizing the need for a nuanced understanding of individual differences.

Ehrman and Oxford (1989) provide further insights into personality-driven language acquisition strategies. Extroverts tend to favor emotive and visualization techniques, while introverts are more deliberate in their communication, carefully considering context and meaning before responding. This distinction highlights how personality traits influence learners' preferences and performance in language use.

Despite the limited research on the direct correlation between personality traits and speaking proficiency, it is reasonable to infer a connection given the social and communicative nature of speaking. This focus on personality provides a conceptual framework for examining its potential impact on learners' ability to develop and demonstrate speaking skills.

Method

Research Design

This study utilized a comparative experimental design to examine the effects of Problem-Based Learning (PBL) on the speaking skills of students with introverted and extroverted personalities. The experimental approach was chosen to establish cause-and-effect relationships, aligning with Johnson and Christensen's (2019) recommendation for studies evaluating interventions. Two groups—categorized by personality type—were exposed to the PBL model, enabling a focused analysis of its impact on speaking proficiency. This design

adheres to Barrows' (1996) assertion that PBL fosters active learning and critical thinking, essential for improving communication skills.

A quantitative methodology was employed to ensure systematic measurement of outcomes and group comparisons. Creswell (2014) emphasizes the suitability of quantitative methods for generating statistically reliable conclusions in educational research. The study took place at the English Education Department of Fatmawati Sukarno State Islamic University, Bengkulu, ensuring a controlled environment for rigorous evaluation, consistent with Cohen, Manion, and Morrison's (2018) guidelines for experimental research.

Participants

The sample comprised 40 students, divided into two groups based on their scores from a self-report questionnaire measuring introversion and extroversion, adapted from Richmond and McCroskey (1998). Although self-reported data provide an accessible means of categorization, potential biases—such as social desirability effects—are acknowledged. Future studies might enhance reliability through triangulation, incorporating validated personality assessments or observational methods for cross-verification.

The sample size was consistent with Cohen, Manion, and Morrison's (2018) recommendations for maintaining validity in small-scale experimental research. Participants' demographic details, such as age and academic background, were controlled to reduce extraneous variability.

Instruments

The instruments used in this study included PBL activities and speaking tests, both designed to evaluate and enhance students' speaking skills. The PBL activities were centered around real-world, open-ended problems that were directly relevant to the course content. These activities incorporated personality-based grouping to ensure tailored engagement for students with diverse traits. The tasks involved problem identification, solution exploration, and collaborative presentations, all of which aimed to foster critical thinking and practical communication skills. Peer feedback and discussions were integral components of the process, providing opportunities for reflection and interactive learning.

The speaking tests were conducted in two phases: a pre-test and a post-test. The pre-test assessed students' baseline speaking abilities, focusing on aspects such as fluency, organization, and confidence. Students participated in structured tasks, including prepared speeches or debates, to provide a comprehensive measure of their initial skill levels. Following the intervention, the post-test

evaluated improvements using the same tasks to ensure consistency. This methodology aligns with Creswell's (2014) recommendation for employing repeated measures to track changes over time. Both tests utilized rubrics with clearly defined criteria, ensuring consistent and objective evaluation throughout the study.

Procedure

The study followed a systematic procedure to ensure reliability and replicability of results. First, participant recruitment was conducted at a single institution to control for contextual variables. Students were invited to participate, and informed consent was obtained to ensure ethical compliance with institutional review board (IRB) standards.

Next, a personality assessment was administered using a questionnaire. The results of this assessment were used to categorize participants into introverted or extroverted groups, enabling the study to explore the role of personality traits in the effectiveness of PBL.

Following this, the PBL intervention took place over a designated period. Participants engaged in structured PBL activities guided by facilitators, who ensured adherence to the PBL framework and supported discussions. These activities focused on fostering critical thinking, collaboration, and communication skills through problem-solving tasks.

Finally, pre- and post-tests were conducted to evaluate the impact of the intervention. Speaking tests administered before and after the PBL activities assessed changes in participants' performance, providing measurable data on the effectiveness of the approach.

Throughout the study, ethical considerations, including confidentiality and voluntary participation, were rigorously maintained to uphold the integrity of the research.

Data Analysis

The data analysis was conducted using SPSS (Statistical Package for the Social Sciences), a reliable tool for processing and interpreting quantitative data (Field, 2018). The process involved several steps to ensure a thorough and objective evaluation of the findings.

First, categorization and scoring were carried out for the personality questionnaire. Responses were converted into Likert-scale scores ranging from 1 (strongly disagree) to 5 (strongly agree), with a maximum possible score of 70. This scoring system provided a standardized way to quantify personality traits.

Next, descriptive statistics were computed to summarize the pre- and post-test results. Measures of central tendency, including the mean and standard deviation, were calculated to provide a clear overview of students' speaking performance before and after the intervention.

To explore differences in speaking improvements between introverted and extroverted groups, comparative analysis was performed. Independent t-tests and paired sample t-tests were employed to assess statistical significance. The analysis adhered to Teddlie and Tashakkori's (2009) guidelines for ensuring meaningful and accurate comparative insights.

Additionally, frequency and percentage analysis was used to summarize the questionnaire data, offering a clear view of the personality distribution patterns among participants (Pallant, 2020).

Each analysis method was explicitly aligned with the study's objectives, ensuring that the results were relevant and contributed to addressing the research goals.

However, the study's findings should be interpreted with caution due to certain limitations. The reliance on self-reported data and the relatively small sample size may restrict the generalizability of the results. Future research could address these limitations by incorporating larger, more diverse samples and triangulated data collection methods to enhance the robustness of the findings.

Findings

The Descriptive Analysis of Pre-test and Post-test Scores in Introvert Class

This section presents the findings from a comprehensive statistical analysis of students' speaking proficiency in the Introvert class before and after the intervention. The assessment of students' speaking skills encompasses six specific dimensions: grammar, vocabulary, comprehension, fluency, pronunciation, and task performance. Students' scores were classified to determine their level of speaking competency, ranging from excellent to poor, as depicted in Chart 1. This analysis provides a nuanced understanding of the impact of the intervention on various aspects of speaking proficiency.

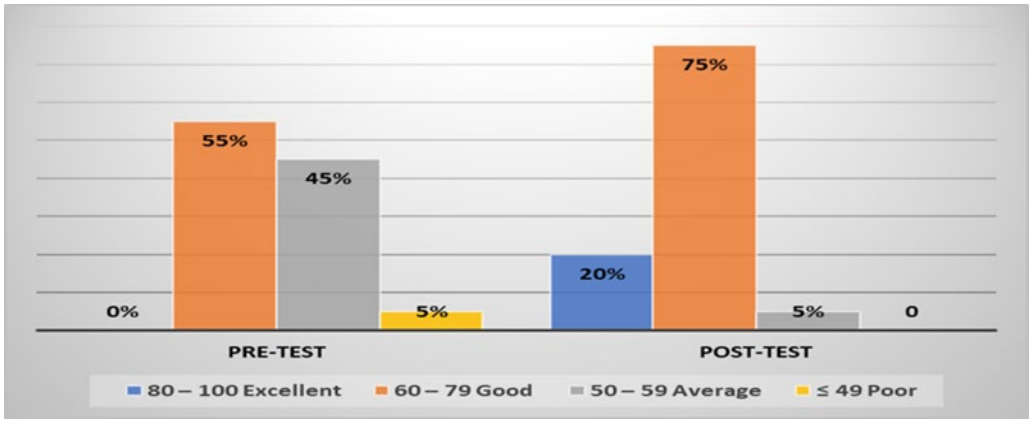

Chart 1. Pre-test and post-test scores in Introvert group.

As illustrated in Chart 1, the enhancement in speaking proficiency among introverted students becomes evident following the integration of PBL. In the pre-test, 1 student (5%) was classified as poor, 9 students (45%) as average, and 11 students (55%) as good. In contrast, after the intervention, the distribution shifted to 1 student (5%) in the average category, 15 students (75%) in the good category, and 4 students (20%) in the excellent category. This shift provides valuable insights into the speaking abilities of students, clearly demonstrating a significant improvement in speaking skills within the introvert class following instruction using the PBL model.

The Descriptive Analysis of Pre-test and Post-test Scores in Extrovert Class

The following illustration presents the results of both the pre-test and post-test assessments for students in the extrovert class. Subsequently, the researcher categorized the scores to assess the proficiency levels of students in speaking, employing criteria spanning from excellent to poor, as detailed in Chart 2.

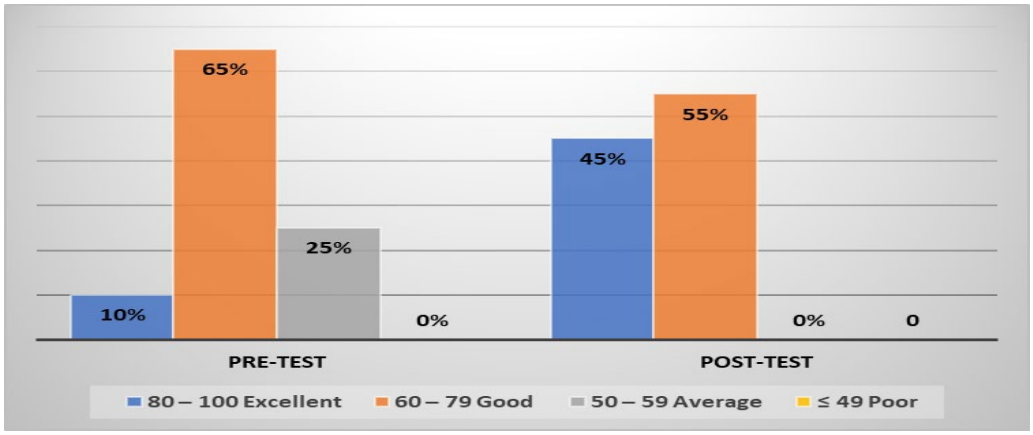

Chart 2. Pre-test and post-test scores in Extrovert group.

As depicted in Chart 2, there is a noticeable enhancement in the speaking proficiency of students in the extrovert group following the implementation of PBL. In the pre-test, 5 students (25%) were categorized as average, 13 students (65%) as good, and 2 students (10%) as excellent. In contrast, in the post-test, the distribution shifted to 11 students (55%) in the good category and 9 students (45%) in the excellent category. This distribution offers valuable insights into the speaking abilities of students, clearly demonstrating a significant improvement in speaking skills within the extrovert class following instruction using the PBL model.

The Comparison Descriptive Analysis of Pre-test and Post-test Scores in Introvert Class and Extrovert Class

The table below presents a comprehensive descriptive analysis of the average speaking ability scores among students in both the Extrovert and Introvert groups before and after receiving instruction through the Problem-Based Learning (PBL) model. It delineates the average scores of students in the pre-test and post-test, categorized by their introverted and extroverted traits.

	Pre-test		Post-test	
Score	**Introvert**	**Extrovert**	**Introvert**	**Extrovert**
SUM	20	20	20	20
MEAN	61.6	65.6	72.9	78.2
SD	8.75	9.65	9.11	12.01
MAX	77	83	91	98
MIN	47	50	59	60

Table 1. Average Scores of Students in the Pre-Test and Post-Test.

The data presented in the table highlights the average scores of both introverted and extroverted students during the pre-test and post-test phases, revealing a notable improvement in scores for both groups. Specifically, the average score

for introverted students increased from 61.6 to 72.9, while for extroverted students, it rose from 65.6 to 78.2.

Overall, both introverted and extroverted students demonstrated significant score improvements from the pre-test to the post-test. This rise underscores the efficacy of the Problem-Based Learning (PBL) model in fostering learning and enhancing speaking skills across both personality types. Moreover, the consistent higher scores achieved by extroverted students in both tests suggest a potential area for further investigation. In conclusion, these findings affirm that the PBL approach has effectively contributed to enhancing student performance in speaking proficiency.

The Statistical Analysis of Pre-Test and Post-Test Scores in Introvert and Extrovert Group

The t-test is a statistical tool used to assess whether there is a significant difference between the means of two groups. Before conducting a t-test, it is essential to verify if the data meets specific assumptions, primarily focusing on normality and homogeneity of variance. Normality pertains to the assumption that the data follows a normal distribution, ensuring the accuracy of t-test results. If the data deviates from normality, the outcomes of the t-test may be compromised. Similarly, homogeneity of variance assumes that the variances within the compared groups are equal; discrepancies here could also impact the reliability of t-test results. Thus, checking for normality and homogeneity of variance is crucial prior to conducting a t-test to uphold the integrity of the findings.

Table 2 below outlines the results of the normality tests conducted on the speaking proficiency of students in both the introvert and extrovert groups. The Kolmogorov-Smirnov test, employed in this study, assesses whether sample data conform to a normal distribution. This analysis ensures that the subsequent statistical tests are conducted appropriately and reliably reflect the characteristics of the data.

	Students	**Kolmogorov-Smirnova**			**Shapiro-Wilk**		
	Personality	Statistic	df	Sig.	Statistic	df	Sig.
Post-test	Introvert	.093	20	.200*	.972	20	.797
	Extrovert	.152	20	.200*	.933	20	.178
*. This is a lower bound of the true significance.							
a. Lilliefors Significance Correction							

Table 2. Test of normality.

Based on the Kolmogorov-Smirnov test presented in Table 2, the significance values for all variables are below the alpha level of 0.05 (5%), indicating that all variables exhibit a normal distribution. Therefore, it can be inferred that both the introvert and extrovert groups of students conform to normal distribution assumptions.

In summary, Table 2 provides the outcomes of statistical tests assessing the normality of the introvert and extrovert groups. The results strongly suggest that both groups adhere to a normal distribution.

Table 3 below presents the findings from the homogeneity test conducted on the speaking proficiency of students in both the introvert and extrovert groups. The Levene test, utilized in this analysis, examines whether these groups exhibit equal variances.

Levene Statistic	**df2**	**df2**	**Sig.**
2.153	1	38	.151

Table 3. Test of Homogeneity of Variance.

According to Levene's test results shown in Table 3, both the Extrovert and Introvert groups of students, following instruction with the PBL model, exhibit a significance value (sig) of 0.151. Comparing this sig value with the alpha level (α) of 0.05 reveals that the sig value exceeds α = 0.05. This indicates that the variance in speaking ability data among students in both groups—Extrovert and Introvert—is consistent and homogeneous.

Having conducted these prerequisite tests and confirmed adherence to the requirements for conducting a t-test, the next step involves performing the t-test to evaluate mean differences. The results of the t-test for mean differences are detailed in Table 4 below.

		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	2.153	.151	1.557	38	.001	5.250	3.372	1.576	12.076
	Equal variances not assumed			1.557	35.435	.001	5.250	3.372	1.592	12.092

Table 4. Independent Sample Test

The table presented above illustrates the outcomes of a t-test conducted on the average post-test speaking ability scores of both Extrovert and Introvert student groups, following instruction with the PBL model. This table provides two significant values for the average difference test, one assuming equal variances and the other not assuming equal variances. Based on preliminary test results indicating consistent variance in speaking ability scores between the Extrovert and Introvert groups, the significance value in this average difference test is considered assuming equal variances.

Referring to the t-test results, the significance value for the two-tailed test is 0.001. Comparing this significance value with the α value of 0.05 reveals that sig. (2-tailed) = 0.001 is less than $\alpha = 0.05$. This indicates a significant difference in the speaking abilities of students in the Extrovert and Introvert groups, tested at a significance level of $\alpha = 0.05$. In simpler terms, following instruction using the PBL model, the speaking abilities of Extrovert and Introvert student groups exhibit a statistically significant difference at the $\alpha = 0.05$ significance level.

Discussion, Conclusions, and Suggestions

Discussion

The analysis reveals a significant improvement in students' speaking skills across both introverted and extroverted groups after the implementation of Problem-Based Learning (PBL). This finding underscores the effectiveness of PBL in enhancing speaking competence, aligning with Barrows' (1996) assertion that PBL promotes active engagement and critical thinking—essential components for developing communication skills. Furthermore, PBL encourages self-directed inquiry, as highlighted by Schmidt, Loyens, Van Gog, and Paas (2007), enabling students to apply their knowledge in practical contexts.

One of the most notable outcomes of this study is the broader educational impact of PBL, regardless of students' personality traits. For instance, PBL fosters long-term knowledge retention by engaging students in active problem-solving, as supported by Hmelo-Silver (2004). This method shifts teaching practices away from rote memorization toward dynamic and meaningful interactions, equipping students with skills relevant to real-world scenarios. According to Savery and Duffy (1995), PBL also nurtures essential communication and negotiation skills, while Wood (2003) emphasizes its role in promoting collaboration and social interaction. These attributes are critical for students' academic and professional success, as noted by Norman and

Schmidt (1992), who advocate for PBL as a mechanism to cultivate critical thinking and problem-solving abilities.

The study sheds light on how personality traits influence the effectiveness of PBL. Introverted students, who typically prefer solitary tasks and observation (Richards & Schmidt, 2013), benefited from the collaborative and interactive nature of PBL. This engagement aligns with Jonassen's (1999) theory that PBL motivates diverse learners by fostering participation and motivation. For extroverted students, PBL provided ample opportunities for social interaction, enhancing their speaking proficiency. Cain (2012) notes that extroverts' natural tendency toward communication often facilitates language acquisition, which may explain their superior performance.

Conclusions

This study concludes that PBL is a highly effective pedagogical strategy for improving speaking skills in both introverted and extroverted students. The significant improvement in post-test scores for both groups highlight PBL's impact on fostering critical thinking, reasoning, communication, and self-assessment skills. Extroverted students consistently outperformed their introverted counterparts, suggesting that PBL might align more closely with their natural inclinations toward social interaction.

The research contributes to the growing body of evidence supporting PBL as a dynamic and effective educational approach. By addressing the diverse needs of learners, PBL equips students with practical skills and knowledge applicable beyond the classroom. The study also underscores the potential for PBL to bridge the gap between different personality types, fostering a more inclusive and participatory learning environment.

Suggestions

To enhance the effectiveness of Problem-Based Learning (PBL), several suggestions can be made. First, pedagogical strategies for introverted students should be tailored to better accommodate their learning preferences. Incorporating structured reflection periods or forming smaller collaborative groups could create a more comfortable environment for introverted learners. These adjustments would enable them to participate more actively and benefit from the interactive aspects of PBL.

Future research directions could focus on exploring specific modifications to the PBL framework to address the unique challenges faced by introverted students. Investigating the long-term impacts of PBL on speaking skills and examining its application across various educational contexts would provide

valuable insights. Such studies could help refine PBL approaches to maximize their effectiveness for a broader range of learners.

From a practical perspective, educators are encouraged to adopt PBL as a core instructional strategy, given its ability to foster critical thinking and communication skills. To support this transition, professional development opportunities for teachers on designing and implementing effective PBL activities should be prioritized. This training would ensure educators are equipped with the tools and knowledge to maximize the benefits of PBL in their classrooms.

Despite its demonstrated effectiveness, the study acknowledges certain limitations. The findings are based on a relatively small sample size and a single institutional context, which may limit their generalizability. Future research should aim to expand the participant pool and explore diverse educational settings to strengthen the validity and applicability of the results.

In conclusion, PBL has significant transformative potential for language education, particularly in enhancing speaking skills and fostering active learning. Its adaptability makes it a valuable tool for addressing the needs of diverse learners. By incorporating tailored strategies, pursuing further research, and providing practical support for educators, PBL can contribute to more effective and inclusive teaching practices.

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