PROJECT-BASED LEARNING IN THE PROGRESS OF DEEP LEARNING IN A VOCATIONAL HIGH SCHOOL

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ABSTRACT

This research investigates the perceptions of students and English teachers at SMK Negeri 15 Samarinda regarding the implementation of Project-Based Learning (PBL) and its role in fostering deep learning in vocational education. Using a quantitative descriptive method, data were collected through structured questionnaires distributed to 90 eleventh-grade Automotive Engineering students and five English teachers. The student questionnaire assessed Experience, Involvement, and Understanding, while the teacher questionnaire examined the Perceived Benefits and Challenges of PBL. The instruments were found to be valid and reliable, with Cronbach's Alpha values ranging from 0.76 to 0.77. Findings revealed that students generally perceived PBL positively, with mean scores indicating frequent engagement in practical tasks, moderate to high participation, and improved comprehension. Teachers also expressed strong support for PBL, particularly for its ability to enhance critical thinking, collaboration, and independent learning. Although some challenges such as time constraints and resource limitations were noted, they were not viewed as critical barriers. Correlation analysis showed significant relationships among all three student variables at the 0.01 level. Notably, Involvement and Understanding were strong predictors of Experience, as shown by a regression model with a correlation coefficient (R) of .762. Overall, the findings affirm PBL's effectiveness in promoting deep learning and 21st-century competencies in vocational contexts. While challenges exist, both student and teacher perspectives support PBL as an adaptable and impactful instructional approach. These insights contribute to the growing body of research supporting PBL's application in Indonesian vocational high schools.

INTRODUCTIONS

The primary objective of vocational high school education is to equip students' pragmatic competencies which may be directly established for a occupational domain, in which the objective of all participant within the integrated system is to generate a cohesive effect through the coordination of their collaborative (Anwar et al., 2023; Firdaus et al., 2024; Shaidullina et al., 2015; Sumarno et al., 2017). Additionally, these challenges are largely attributed to the technical demands of the subject matter, the requirement for computational thinking skills, and the limited availability of instructional resources.

Project-Based Learning (PBL) is a pedagogical movement that encourages students to engage in further exploration in a demanding, complex generation of world, organizing learning around authentic projects that require the exploration and application of subject matter to complex, professionally relevant problems (Chiang & Lee, 2016). However, the implementation of PBL is expected to promote greater student engagement, foster critical thinking, encourage collaborative learning, and deepen comprehension of the deep learning principle (Harahap et al., 2025; Yang et al., 2024). Therefore, this research illustrates an impact in assessing the effectiveness of PBL in enhancing vocational students' mastery of deep learning, as well as in identifying the challenges with its practical application.

In education, deep learning is a method that uses critical, introspective, creative, and applied thinking processes to attain a thorough grasp of the course materials (Akmal et al., 2025; Bose, 2021). Moreover, the statement from the Indonesian Minister of Primary and Secondary Education, Prof. Abdul Mu'ti, in Puspapertiwi (2024), Deep learning refers to a method of instruction that involves students actively participating in crucial, contemplative, and innovative thinking as well as problem-solving to process material deeply. As stated by Nana & Brenya (2024), the changing of the educational context, cultivating deep learning, is critical to developmental education in this generation.

PBL is an excellent educational technique for deep learning because it promotes elaborate comprehension, strengthens pragmatic and conceptual skills, and engages students in significant, practical assignments (Chiang & Lee, 2016). Considering its benefits, effective implementation of PBL necessitates meticulous organization and supervision owing to problems including time restrictions, curriculum cooperation, and diverse student engagement. By looking at the present research concern, the term deep learning has become a trend since the Minister of Primary and Secondary Education mentioned it in several interviews. Furthermore, it was mentioned that deep learning has the capability for students to reach meaningful, joyful, and mindful learning.

Numerous English teachers in Indonesia still implement irrelevant, teacher-centered methods that restrict their students' development of higher-order thinking and creativity (Jacob & Lie, 2022; Murphy et al., 2021). Then, these methods prevent the progress of various intelligences and critical skills that are necessary in today's environment. Therefore, teachers must use more interactive and enjoyable teaching strategies to increase student engagement and educational outcomes (Susanti et al., 2020).

The intended outcome of vocational high schools is other than that for giving students practical skills for potential careers, such as the capacity to communicate effectively in English (Sumarno et al., 2017). However, a lack of specialization with limited learning resources causes several students to struggle with English. Moreover, teachers typically use textbooks that are not tailored to the particular requirements of various vocational programs. Additionally, learning resources should be in a specific field and aligned with the English for Specific Purposes (ESP) strategy to foster students' development (Susanti & Trisusana, 2018).

Today's education focuses on actively engaging students in their research and encouraging them to gain real-world skills, two essential strategies, Project-Based Learning and Problem-Based Learning, specifically, are developed to accomplish authentic, hands-on activities that influence kids to reflect in logically (Maida, 2011; Savery & Duffy, 2001). Additionally, Inquiry-Based Learning involves a student-centered, innovative, problem-solving approach that is directed by a teacher who serves as an advisor, implementing appropriate approaches to stimulate independent discovery, partnership, and comprehension, and encouragement by practical and comprehensive assessment (Duran & Dökme, 2016).

Subsequently, Blended Learning and Flipped Classroom integrate technological tools such as Duolingo, Google Classroom, Zoom, YouTube, and others with conventional teaching techniques to provide a diverse and dynamic learning environment. Also, this combines both offline and online education to provide individual assistance while emphasizing speaking abilities and stimulating topics (Alqarni, 2018; Slavin, 2007).

Furthermore, a widely recognized method of pedagogy that draws attention to student-centered inquiry and practical application in PBL. According to Chiang & Lee (2016), PBL provides a progressive and student-centered educational approach that promotes logical thinking, collaborative work, and practical applications of problem-solving skills.

Equally important, despite the lack of a standardized definition, PBL is broadly acknowledged for its focus on collaborative, research-oriented education and active student involvement (Almulla, 2020; Handrianto & Rahman, 2018). In other words, further research should also look into the potential barriers and facilitators of

implementing PBL, particularly in university settings, to gain a better understanding of how it works across different educational systems.

Vocational high school students must acquire fundamental skills in nowadays generation, including problem-solving, intercommunication, creativity, and collaboration, to meet the demands of the modern workforce (Megayanti et al., 2020). Furthermore, Project-Based Learning (PBL) is being used by vocational schools to develop these abilities through practical projects. The implementation in vocational high school demonstrates the numerous benefits of PBL for developing students' analytical thinking, solving issues, communication, teamwork, and creative skills that align with the present environment competency framework.

Vocational high schools are progressively stressing the development of entrepreneurial abilities to generate graduates who are both employable and capable of starting their own businesses (Affandi et al., 2021; Masdarini et al., 2024). Moreover, PBL's student-centered strategy fosters active engagement and problem-solving, promoting analytical thinking and practical abilities, both of which are essential for entrepreneurial preparedness. In addition, it also serves as a platform for supporting intellectual development through sustainability principles. As stated by Shrestha & Khadka (2022), the implementation of technological resources and online educational platforms has expanded the scope and usefulness of this method. Design-based learning, for instance, has been observed to increase students' participation in secondary education. Therefore, the data also shows that great education increases learning outcomes and encourages critical thinking in children.

Furthermore, deep learning is largely based on the capacity of students to analyze logically, integrate updated information into existing circumstances, and construct a significant understanding of concepts. According to Zhu & Niyozov (2024), deep learning is both an approach and the result of purposeful and diverse discourse in the educational environment, allowing kids to gain more understanding, improved argumentation, and sharpened interpersonal abilities. Such results require teaching techniques that enable students to engage with issues, observation, and their perceptions of their surroundings.

Moreover, it provides a tremendous method for progressing deep learning by involving students in the present situations, demanding assignments that promote analytical thinking, cooperation, and skill applications. According to Han (2023), while deep learning focuses on valuable comprehension, information integration, and the enhancement of cognitive abilities, PBL offers an efficient system for achieving these objectives. Moreover, this research emphasizes that PBL has demonstrated academic advantages in past studies, particularly in fundamental education. Furthermore, there is still a demand to develop teaching methodologies and control in the environment to intend for optimizing its effectiveness in directing students to genuine and significant learning (Rojas-Palacio et al., 2024).

Along with this, another researched addresses the process by which PBL facilitates the progression of deep learning in blended classrooms. As stated by Gao (2023) his research at Zhaoqing, Guangdong, China, PBL takes students by conducting systematic phases, such as project selection, planning, exploration, creation, presentation, and evaluation, to help them develop critical thinking, collaboration, interpersonal skills, and self-directed learning abilities. However, deep learning is not only turns into the objective of the project, but it also facilitates the process by allowing students to utilize and interpret their knowledge in real-world scenarios. According to Marisah & Robiasih (2017), PBL may cause an improvement for students in vocational high school in SMK Negeri 1 Bantul, Central Java, resulting in PBL serving as an effective alternative learning approach, as it promotes not merely the enhancement of language skills, otherwise the integration of social and technological competencies.

As depicted by Apriadi et al. (2020) Project-Based Learning provides a learning strategy that engages students in a project and acquires information based on practical experience. Therefore, the researchers performed experiments in this research to determine the variations among the number of students instructed via project-based learning and the group of students who were taught on light vehicle engineering competencies. Then, it aims to enhance the learning results and abilities of vocational high school students' proficiency in Automotive engineering.

In addition, previous studies at the primary school level found that creating a deep learning mentality among instructors is a difficult task. It necessitates long-term dedication, ingenuity, and the capacity to adapt to new obstacles (Hendrianty et al., 2024). Nonetheless, the advantages are significant, as transformative learning prepares students to be logical thinkers, competent speakers, and moral citizens who are capable of understanding the complexity of a rapidly changing world. Meanwhile, from the deep learning perspective, deep learning

techniques can enhance students learning outcomes compared to traditional teaching approaches (Lubis & Ariansyah, 2024). Moreover, it resulted that 27% the students improved their analytical skill in deep learning rather than learning with the conventional method, therefore the research conducted in Islamic school located in Pasuruan, East Java.

Therefore, this research emphasizes the implementation of PBL in teaching English to vocational students and its impact on students' deep learning development. Furthermore, it specifically explores the perceptions of students and teachers regarding the effectiveness of PBL, as well as the challenges encountered in its implementation. Moreover, this research is important because it provides insights into how pedagogical practices can be adapted to respond to the various necessities of vocational high school students, particularly in enhancing their English language proficiency through deep learning strategies.

On the previous research, this illustrates that the implementation that utilize on PBL in the progress of deep learning has a significant impact on most of the research. Therefore, the latest research will focus on the effectiveness which students' development on the method of PBL, and investigate teachers' perception related to the method.

METHOD

Quantitative approach is utilized for systematically investigating perceptions regarding the potency of Project-Based Learning (PBL) in fostering deep learning skills among vocational high school students and teachers (Creswell, 2009). Therefore, the research is designed to address two main research questions on how students perceive the effectiveness of PBL in enhancing their deep learning skills, and what teachers perceive regarding the role of PBL in the progress of deep learning.

Furthermore, the eleventh-grade vocational students become the population that focuses on the Automotive major and English subject teachers from SMK Negeri 15 Samarinda. Furthermore, the sample includes approximately 90 students from the 11 grades of the Automotive major and 5 English subject teachers who have implemented PBL in the classroom. Therefore, the choice of Automotive students is intended, as vocational education emphasizes practical, project-based techniques, making them suitable subjects for assessing PBL's effect on deep learning and competence development.

To collect the necessary data, a structured questionnaire was used as the primary instrument. Furthermore, the questionnaire is designed based on a 4-point Likert scale, with response options ranging from "Strongly Agree" and "Strongly Disagree". However, the decision on this scale is intentional to encourage respondents to give their concrete opinions rather than a neutral point, therefore reducing the potential for uncertain answers. In addition, the questionnaire items are developed to capture conceptual aspects of PBL in the progress of deep learning, ensuring that both students' and teachers' perceptions are deeply analyzed.

The data in this research were evaluated utilizing quantitative descriptive statistical methods. Because the data were acquired using a 4-point Likert scale questionnaire, the analysis focuses on describing and summarizing students' and teachers' perceptions of the progress of PBL in fostering deep learning skills. Additionally, with the use reliability coefficient from Guilford (1954) which becomes the range of this analysis.

Furthermore, descriptive statistics such as frequencies, percentages, mean scores, and standard deviations will be measured for each questionnaire item. moreover, these statistical measurements will provide an accurate depiction of how respondents perceive various aspects of Project-Based Learning. Then, the mean scores show the respondents' average perception, but the standard deviations indicate the amount of diversity in their responses. To interpret the data, the mean scores divided into specific categories, such as "Very High," "High," "Low," and "Very Low" perceptions, determined by the established intervals. Therefore, the data will be analyzed by using the Statistical Package for the Social Sciences (SPSS) to maintain the reliability and efficiency of the results. Overall, the data interpretation will be based totally on descriptive statistics, without using inferential testing, in alignment with the research's quantitative descriptive design.

RESULT AND DISCUSSION
Result

The current research analyzed the perceptions of 90 Grade XI Automotive Engineering students and five English teachers from SMK Negeri 15 Samarinda regarding the implementation of PBL in fostering deep learning.

The data, collected via structured questionnaires, were analyzed descriptively through means, percentages, and standard deviations.

To maintain the validity, the researcher has constructed the construct with an R-table of 0,1745, while each item of the instrument reached up to an R-table. The table below explains the items of the validity test:

Table 1. Validity Test Result

No. of Questions	R-value	No. of Questions	R-value
1	0,653	9	0,725
2	0,629	10	0,578
3	0,629	11	0,709
4	0,618	12	0,653
5	0,702	13	0,439
6	0,507	14	0,581
7	0,453	15	0,576
8	0,637		

The reliability statistics used as reliable on this instrument, the Cronbach's Alpha value for the Experience component is 0.77, for Involvement is 0.76, and for Understanding is also 0.77, with all three sections consisting of five statements. Moreover, with coefficients ranging from 0.60 to 0.80 suggest a good level of reliability. As a result, it can be concluded that the instrument used in this research is accurate in assessing Experience, Involvement, and Understanding.

Table 2. Students' Reliability Questionnaire Statistics

RELIABILITY STATISTICS			
Cronbach's Alpha	0.77	0.76	0.77
N of Items	5	5	5
Sections	Experience	Involvement	Understanding

On the other side, the teacher's questionnaire used in this current research was adopted from Nurulia's (2015) instrument. Additionally, this previous questionnaire focuses on three necessary aspects: instructors' comprehension, implementation, and issues in using Project-Based Learning (PBL); however, the current research modified it to include two sections on benefits and challenges. Overall, the questionnaire is regarded as a reliable instrument for gathering information on how PBL is seen and performed by teachers in the classroom.

Students' Experience with PBL:

Table 3. Students' Experience

Statement	Percentage				Mean	Std. Dev
	SD=1	D=2	A=3	SA=4		
I am involved in real or meaningful projects during English lessons.	2.2	11.1	78.9	7.8	2.92	0.52
The project I worked on helps me connect English lessons with daily life or my future career.	1.1	4.4	62.2	32.2	3.25	0.59
I have enough time and resources to complete the project tasks.	2.2	11.1	73.3	13.3	3	0.58
I clearly understand the goals and expectations of the given project.	1.1	10	77.8	11.1	3	0.5
The project I worked on required me to solve real or complex problems.	1.1	20	63.3	15.6	2.93	0.63

Notes;SD:Strongly Disagree;D:Disagree; A:Agree; SA:Strongly Agree

Students reported a generally positive experience with PBL. The mean scores for experience-related items ranged from 2.92 to 3.25 on a 4-point Likert scale. The highest mean (3.25) corresponded with 32.2% of students strongly agreeing that PBL was a meaningful part of their English learning. The majority of students agreed with the statements, with some items showing 78.9% agreement, suggesting PBL had been effectively

implemented in their classroom context. Standard deviation values interval from 0.50 to 0.63, addressing a moderate level of response consistency across the sample.

Students' Involvement with PBL:

Table 4. Students' Involvement

Statement	Percentage				Mean	Std. Dev
	SD=1	D=2	A=3	SA=4		
I feel motivated to participate in PBL (Project-Based Learning) activities in English class.	1.1	26.7	65.6	6.7	2.78	0.57
I actively contribute ideas and suggestions during group work.	1.1	18.9	63.3	16.7	2.95	0.63
I enjoy collaborating with my classmates to complete the project.	2.2	6.7	62.2	28.9	3.17	0.64
The learning activities make me more interested in English lessons.	2.2	28.9	57.8	11.1	2.78	0.66
I feel responsible for the success of my group's project.	2.2	12.2	64.4	21.1	3.04	0.65

Notes;SD:Strongly Disagree;D:Disagree; A:Agree; SA:Strongly Agree

Student involvement in PBL showed moderate to high engagement, with mean values ranging from 2.78 to 3.17. Agreement responses remained dominant, with 65.6% and 64.4% agreeing with the involvement statements. However, some students (up to 28.9%) disagreed, suggesting varying degrees of participation possibly influenced by motivation, project design, or support. The standard deviation values (0.57–0.66) reflected these variations in involvement levels.

Students' Understanding through PBL:

Table 5. Students' Understanding

Statement	Percentage				Mean	Std. Dev
	SD=1	D=2	A=3	SA=4		
I can explain the project topic in my own words.	3.3	30	55.6	11.1	2.74	0.7
The project helps me think critically and analyze information in depth.	13.3	13.3	62.2	20	3	0.71
I learn how to apply English in various contexts through this project.	1.1	6.7	76.7	15.6	3.06	0.51
The project encourages me to evaluate different ideas before making decisions.	1.1	5.6	74.4	18.9	3.11	0.52
I am able to produce a final product that demonstrates my understanding of the topic.	2.2	21.1	61.1	15.6	2.9	0.671

Notes;SD:Strongly Disagree;D:Disagree; A:Agree; SA:Strongly Agree

The comprehension aspect revealed mean scores between 2.74 and 3.11. A substantial portion of students (55.6%–76.7%) agreed that PBL improved their understanding of English material. Standard deviations ranged from 0.52 to 0.71, indicating some variability in how students perceived the impact of PBL on their learning. Nevertheless, the majority recognized PBL as contributing to deeper comprehension.

Teachers' Perceived Benefits of PBL:

Table 6. Teachers' Benefits

Statement	Percentage				Mean	Std. Dev
	SD=1	D=2	A=3	SA=4		
PBL increases students' engagement in learning English.	0	0	40	60	3.6	0.55
PBL helps students understand the material more deeply (Deep Learning).	0	0	60	40	3.4	0.55

PBL is effective in developing students' critical thinking skills.	0	0	60	40	3.4	0.55
PBL motivates students to learn independently and seek information.	0	0	60	40	3.4	0.55
PBL makes learning more relevant to students' future careers.	0	0	60	40	3.4	0.55
PBL enhances students' collaboration and teamwork skills.	0	0	60	40	3.4	0.55
PBL helps students apply English concepts in real-life contexts.	0	0	60	40	3.4	0.55
PBL provides a more meaningful learning experience for students.	0	0	40	60	3.6	0.55
PBL encourages students' creativity in solving problems.	0	0	40	60	3.6	0.55
PBL increases students' confidence in presentations and communication.	0	0	40	60	3.6	0.55

Notes;SD:Strongly Disagree;D:Disagree; A:Agree; SA:Strongly Agree

Teachers reported strong agreement on the pedagogical benefits of PBL. Mean scores ranged from 3.4 to 3.6, and all responses were either "Agree" or "Strongly Agree." Specifically, 60% of teachers strongly agreed with six of ten items, confirming a unified positive stance on PBL's effectiveness. The low standard deviation of 0.55 reflected consistent perceptions among the teachers.

Challenges Faced by Teachers in Implementing PBL:
Table 7. Teachers' Challenges

Statement	Percentage				Mean	Std. Dev
	SD=1	D=2	A=3	SA=4		
I have difficulty designing projects that align with the English curriculum.	0	20	80	0	2.8	0.45
The available time is not sufficient for optimal PBL implementation.	0	40	60	0	2.6	0.55
Some students are less active in contributing to their project groups.	0	20	80	0	2.8	0.45
School facilities and resources are insufficient to support PBL implementation.	0	40	60	0	2.6	0.55
Assessing PBL projects requires extra time and effort.	0	40	60	0	2.6	0.55
Some students struggle to understand complex project instructions.	0	40	60	0	2.6	0.55
PBL is difficult to apply to students with low academic ability.	0	40	60	0	2.6	0.55
I lack training on effective PBL implementation strategies.	0	20	80	0	2.8	0.45
Parents/guardians are not supportive of project activities outside school hours.	0	40	60	0	2.6	0.55
I experience difficulties in managing group progress during PBL.	0	40	60	0	2.6	0.55

Notes;SD:Strongly Disagree;D:Disagree; A:Agree; SA:Strongly Agree

Although teachers generally supported PBL, they acknowledged certain implementation challenges. Mean scores for these items ranged from 2.6 to 2.8, indicating moderate concern. Around 60% to 80% of teachers agreed that challenges such as time constraints and resource limitations existed, though 20% to 40% disagreed, suggesting

some challenges were not universally experienced. The standard deviation remained low (0.45 to 0.55), highlighting relatively uniform responses.

The correlation table and model summary illustrated on the correlations between three variables: experience, involvement, and understanding, using data from 90 participants.

Table 8. Correlation on Students' Variables

Correlation		Experience	Involvement	Understanding
Experience	Pearson Correlation	1	.676**	.671**
	Sig. (2-tailed)		.000	.000
	N	90	90	90
Involvement	Pearson Correlation	.676**	1	.562**
	Sig. (2-tailed)	.000		.000
	N	90	90	90
Understanding	Pearson Correlation	.671**	.562**	1
	Sig. (2-tailed)	.000	.000	
	N	90	90	90

Model Summary				
Model	R	R Square	Adjusted R Square	R Std. Error of the Estimate
1	.762a	.581	.572	1.28016

Discussion

The results of this research show that both students and teachers in the vocational high school context, particularly in the major of Automotive Engineering at SMK Negeri 15 Samarinda, have a generally good impression of Project-Based Learning (PBL) as an effective way of stimulating deep learning. Moreover, the student sample (N=90) was evaluated in each of the three aspects: experience, involvement, and understanding, while five English teachers evaluated PBL in terms of benefits and challenges.

From the students' perspective, the descriptive analysis showed that the experience dimension provided mean scores ranging from 2.92 to 3.25, indicating that students perceive themselves as frequently exposed to PBL environments that reflect real-world learning contexts. In terms of involvement, mean scores ranged from 2.78 to 3.17, suggesting moderate to high levels of participation in project tasks. Although students generally engaged actively, standard deviation values between 0.57 and 0.66 suggest a degree of variation in the depth of engagement. As for understanding, mean scores ranged from 2.74 to 3.11, revealing that students consider PBL as conducive to comprehension and cognitive processing. The variability in this aspect, with standard deviations ranging from 0.52 to 0.71, therefore this reflects the varying amounts of conceptual processing among students.

Moreover, teachers also showed strong support for PBL, particularly in recognizing its instructional benefits. The mean scores on the benefit aspect ranged from 3.4 to 3.6, indicating a high level of agreement that PBL enhances critical thinking, collaboration, and independent learning. In contrast, the challenge aspect presented slightly lower mean values, between 2.6 to 2.8, suggesting that while challenges such as time management, resource limitations, and student readiness are present, they are not perceived as critical barriers. The standard deviation in this section remained low (0.45 to 0.55), signifying a relatively uniform perception among educators.

The correlation table reveals that all three variables have a significant and beneficial correlation at the 0.01 level (two-tailed). In particular, Experience is significantly correlated with Involvement (r =.676) and Understanding (r =.671), implying that as students get more experience, their involvement and understanding presumably increase. Furthermore, Involvement and Understanding are moderately associated (r =.562), indicating a significant but significantly weaker association. For the model summary, a multiple regression analysis was utilized with Understanding and Involvement as predictors for Experience. The model provided a correlation coefficient (R) of .762, indicating a strong relationship between the predictors and the dependent variable. Therefore, the findings indicate that both Understanding and Involvement substantially enhance the development of Experience among the participants.

These findings are consistent with prior research. Han (2023) emphasized PBL's capacity to support deep learning by offering real-world relevance and interactive learning environments, aligning closely with the current results. Gao (2023) proposed a structured PBL framework that promotes analytical thinking, and even though his work focused on blended settings, the same stages of exploration, creation, and evaluation were observed in the traditional classrooms of this research. Apriadi et al. (2020) also highlighted PBL's effectiveness in enhancing 21st-century competencies in vocational students, reinforcing the current findings. From a teacher development perspective, Hendrianty et al. (2024) noted the importance of long-term commitment and adaptability in promoting deep learning, which reflects the supportive yet realistic stance of the teachers in this research. In summary, Project-Based Learning proves to be a robust and flexible instructional strategy that supports deep learning in vocational education. While implementation challenges persist, the overwhelmingly positive responses from both students and teachers reinforce PBL's relevance and impact. These findings not only affirm existing literature but also underscore the relevance of aligning PBL to the unique necessities of vocational students in the Indonesian education system.

Overall, the findings of this research reveal a broadly positive perception of PBL among both students and teachers in the vocational high school setting, particularly for Automotive Engineering program at SMK Negeri 15 Samarinda. Students' responses across the dimensions of experience, involvement, and understanding demonstrate PBL's effectiveness in engaging learners and promoting deep learning. The experience component showed that students frequently encountered real-world, PBL-aligned tasks, contributing to a meaningful educational experience. The involvement scores indicate that while many students participated actively, individual differences such as motivation and access to support may have influenced levels of engagement. In terms of understanding, students acknowledged PBL as an effective approach for helping them grasp complex material, underscoring the approach's value in promoting analytical thinking and contextual learning. Teachers echoed this sentiment, expressing strong agreement with the benefits of PBL, identifying it as a tremendous method in developing analytical thinking, collaboration, and independent learning skills which essential for vocational and 21st-century education. Although they reported challenges such as limited resources, time constraints, and student readiness, these were perceived as moderate and manageable.

CONCLUSION

All things considered, based on the findings from 90 Automotive Engineering students and 5 English teachers at SMK Negeri 15 Samarinda, it can be concluded that Project-Based Learning (PBL) is an effective strategy for enhancing deep learning in vocational education. Therefore, students reported high levels of agreement in terms of practical learning experiences (mean = 3.25), involvement in implementation (mean = 3.18), and understanding of topics (mean = 3.11), indicating that PBL supports meaningful, mindful, and joyful learning. Additionally, teachers also acknowledged PBL's effectiveness, particularly in promoting active and independent learning (mean = 3.6), although they noted moderate challenges such as limited time and varying student readiness (mean = 2.8), which could be addressed through better planning. Moreover, correlation analysis showed significant positive relationships among experience, involvement, and understanding, while regression analysis confirmed that understanding and involvement significantly predict learning experience (R = .762). Overall, the results demonstrate that PBL helps students connect learning to real-life applications, encourages collaboration, and deepens comprehension in vocational English contexts.

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