

THE INFLUENCE OF PROBLEM BASED LEARNING MODEL AND LEARNING MOTIVATION ON LEARNING OUTCOMES OF LIGHT VEHICLE ENGINE MAINTENANCE LESSONS

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Abstract: *The purpose of this study is to test 1) The existence of learning outcomes of Light Vehicle Engine Maintenance (PMKR) between students who get the Problem Based Learning (PBL) learning model and learning motivation on sent learning outcomes with conventional learning models, 2) There is an interaction between the PBL learning model and learning motivation on learning outcomes in PMKR lessons. 3) There are differences in the PMKR learning outcomes of students who have high learning motivation who receive the PBL learning model treatment. 4) There are differences in learning outcomes of light vehicle engine maintenance students who have low learning motivation who get the PBL learning model. This study used an experimental method with a 2 x 2 factorial design. The population was 80 students, the sample to be used was 66 students taken using simple random sampling technique. Then from the 66 students into 2 groups where Group 1 gathered 33 students into the Experiment Class which was taught with the PBL learning model and Group 2 returned 33 students from the Control class who were taught by the conventional model. The results showed that there were differences in learning outcomes between students who received treatment Problem Based Learning learning model and students who received conventional learning model treatment. There is an interaction between the learning model and learning motivation. Students who have learning motivation are more suited to the PBL model, while students who have low learning motivation are more suited to using the conventional model.*

Keywords: *PBL Learning Model, Conventional Learning Model, Learning Motivation, Learning Outcomes of Light Vehicle Engine Maintenance.*

Abstrak: Tujuan penelitian ini adalah untuk menguji 1) Adanya hasil belajar Pemeliharaan Mesin Kendaraan Ringan (PMKR) antara siswa yang mendapatkan model pembelajaran Problem Based Learning (PBL) dan motivasi belajar terhadap hasil belajar yang dikirim dengan model pembelajaran konvensional, 2) Terdapat interaksi antara model pembelajaran PBL dan motivasi belajar terhadap hasil belajar pada pembelajaran PMKR. 3) Terdapat perbedaan hasil belajar PMKR siswa yang memiliki motivasi belajar tinggi yang mendapat perlakuan model pembelajaran PBL. 4) Terdapat perbedaan hasil belajar pemeliharaan mesin kendaraan ringan siswa yang memiliki motivasi belajar rendah yang mendapatkan model pembelajaran PBL. Penelitian ini menggunakan metode eksperimen dengan desain faktorial 2 x 2. Populasi adalah 80 siswa, sampel yang akan digunakan adalah 66 siswa yang diambil dengan menggunakan teknik simple random sampling.



Kemudian dari 66 siswa menjadi 2 kelompok dimana Kelompok 1 mengumpulkan 33 siswa ke dalam Kelas Eksperimen yang diajar dengan model pembelajaran PBL dan Kelompok 2 mengembalikan 33 siswa dari kelas Kontrol yang diajar dengan model konvensional. Hasil penelitian menunjukkan bahwa terdapat perbedaan hasil belajar antara siswa yang mendapat perlakuan model pembelajaran Problem Based Learning dan siswa yang mendapat perlakuan model pembelajaran konvensional. Terdapat interaksi antara model pembelajaran dengan motivasi belajar. Siswa yang memiliki motivasi belajar lebih cocok menggunakan model PBL, sedangkan siswa yang memiliki motivasi belajar rendah lebih cocok menggunakan model konvensional.

Kata Kunci : Model Pembelajaran PBL, Model Pembelajaran Konvensional, Motivasi Belajar, Hasil Belajar Perawatan Mesin Kendaraan Ringan.

INTRODUCE

In the era of the 21st century, where the development of electronic technology, digital, and the development of engineering technology is so rapid, students must equip themselves and have the ability to live according to their current and future living conditions era 21, where the development of electronic technology, digital, and the development of engineering technology is so rapid, then students must equip themselves and the ability to live according to their current and future living conditions. The future is the period for students who study in the present and to live sustainably with all their challenges. Moreover, in the era of the Asian economic community, each student is required to have competence according to their respective skills. Learning outcomes are one of the references to success in the educational process. Learning outcomes can be in the form of skills possessed by students (Saputra, 2018: 25).

SMK Negeri 1 Tambelang, is one of the Vocational High Schools in Bekasi. In the learning process, schools have the completeness of infrastructure facilities and teacher competencies have met the standards of educational qualifications set by the Government, and most have obtained professional certification according to their respective competencies. However, based on the average score of the final even semester exam results, students in the last three years have not met the minimum completeness criteria standard (KKM) with a score of 75. Following are the average scores for even semester results for PMKR subjects:

Table 1. Average score of even semester results for PMKR subjects

Tahun	Hasil Belajar	KKM	Kesimpulan
2013-2014	72,56	75	Rendah
2014- 2015	73,72	75	Rendah
2015-2016	73, 40	75	Rendah

Source: Data from the Principal of SMKN 1 Tambelang

Based on the results of observations by interviewing PMKR teachers, the cause of the low grades of semester results in these subjects is the lack of student encouragement to get high grades, low learning initiative, less

active students in the learning process, this is in line with previous research which showed that there were still participants Students who have not reached the Minimum Completeness Criteria are caused by the lack of active students during the learning process (Ida, 2021). In addition, the results of observations show that some teachers of SMK 1 Tambelan in applying the learning model are still monotonous and less varied. The determination of the learning model applied must be in accordance with the material being taught, objectives and characteristics (Kristian, 2019).

One of the learning models that are still valid and very widely used by teachers is the conventional learning model. Conventional learning has several meanings according to experts. Traditional learning or also called the lecture method, because this method has long been used as an oral communication tool between teachers and students in the learning and learning process (Djamarah & Zain, 2006). Ujang Sukandi defines that conventional learning is learning that is dominated by the teacher as a "transfer" of knowledge, while students are more passive as "recipients" of knowledge (Sukandi, 2003).

Problem Based Learning according to Rusman is an innovation in learning because in Problem Based Learning students' thinking abilities are optimized through a systematic group or teamwork process so that students can hone, test, and develop their thinking skills on an ongoing basis (Rusman, 2014). Boud and Felletti, Fogarty in Ngalimun said PBL is a learning approach by making confrontations with students/students with practical problems, in the form of *structured* or *open-ended* through stimuli in learning (Ngalimun, 2013). The Problem Based Learning model has been applied through the stages: 1) Student orientation to the problem; 2) Organizing students; 3) Guiding the investigation; 4) developing and presenting the work; 5) analysis and evaluation of problem-solving (Mukhtiyani & Maheasy, 2021).

In addition to the learning model that is a factor that affects student learning outcomes is student learning motivation. The motivation comes from the word motive which is defined as the power contained in the individual, which causes the individual to act or do. Motives cannot be observed directly but can be interpreted in their behavior, in the form of stimulation, encouragement, or power generation for the emergence of a certain behavior (Uno, 2007). Another opinion, according to Sardiman, suggests the definition of learning motivation, which is a mover that arises from within a person to learn and understand what is being studied (Adriana & Sudibjo, 2017). So it can be concluded that motivation is a power or energy change contained in an individual or someone that causes the individual to act, move, channel and direct individual behavior to learn marked by the emergence of feelings and reactions in achieving goals. Based on previous research, learning motivation has a positive and significant influence on student learning outcomes so that by providing strong and high motivations in learning it will have a positive impact on student learning outcomes in SMK (Saputra, 2018).

Based on the explanation related to the PBL learning model and learning motivation as well as the findings of previous researchers. The researcher aims to examine the Problem Based Learning (PBL) Learning Model and Learning Motivation on Learning Outcomes in Light Vehicle Engine Maintenance (PMKR) Class XI SMK

METHOD

This study uses an experimental method with 2 x 2 factorial design. The research population was 80 students, the sample to be used was 66 students. Then the 66 students were grouped into 2 groups where Group 1 amounted to 33 students became the Experiment Class which would be given treatment with the PBL learning model and Group 2 amounted to 33 students became the Control class which would be taught with the conventional model. The design of the research experiment can be described as in the table below, with the following design:

Table 2. Research Design

	A (Method)	A₁ (Problem Based Learning)	A₂ (conventional)
B (Motivation to learn)			
B ₁ (High Learning Motivation)		A ₁ B ₁	A ₂ B ₁
B ₂ (Low Learning Motivation)		A ₁ B ₂	A ₂ B ₂

Data collection techniques used multiple-choice test instruments to measure PMKR learning outcomes and questionnaires to measure students' learning motivation. The data that has been collected through data collection tools will then be analyzed through descriptive and inferential analysis techniques. To test the research hypothesis using *Two Way Anova* and Tukey's test. However, in order to test the hypothesis, it is necessary to test the requirements, namely the normality test and the homogeneity test of the data.

The hypothesis in this study is that the learning outcomes of light vehicle engine maintenance students who are taught using the PBL learning model will be higher than students who are taught using the conventional learning model. The second hypothesis is that there is an interaction between the learning model and learning motivation on the learning outcomes of light vehicle engine maintenance. The third hypothesis is that the learning outcomes of light vehicle engine maintenance students who have high motivation who are taught using the PBL model will be higher than students who are taught using the conventional learning model. The fourth hypothesis is the learning outcomes of light vehicle engine maintenance, students who have low motivation who are taught with the PBL learning model will be lower than students who are taught using the conventional learning model.

RESULT

The research results obtained from processing research data are categorized according to the research design. The following are the results of the descriptive analysis which are tabulated in tabular form.

Table 3. Learning Outcomes Data in Each Treatment Group

Motivation to learn	B1		B2		Number of Rows (© B)
	High Learning Motivation		Low Learning Motivation		
Model Pembelajaran	n		n		
A1	n	= 11	n	= 11	n = 11
PBL Learning Model	\bar{X}	= 26,545	\bar{X}	= 22,182	\bar{X} = 24,364
	S	= 2,018	S	= 1,834	S = 2,920
A2	n	= 11	n	= 11	n = 11
Conventional Learning Model	\bar{X}	= 22,455	\bar{X}	= 23,545	\bar{X} = 23,000
	S	= 2,115	S	= 1,508	S = 1,877
Number of Columns (© K)	n	= 22	n	= 11	n = 44
	\bar{X}	= 24,500	\bar{X}	= 22,864	\bar{X} = 23,682
	S	= 2,907	S	= 1,781	S = 2,522

Based on the table above, it shows that there are differences in learning outcomes between students who receive the treatment of the *Problem Based Learning* model and students who receive the treatment of the conventional learning model. Students with the PBL learning model obtained an average score of 24,36, higher than the conventional learning model which averaged 23,00. The results of the *Kolmogorov-Smirnov* normality test can be seen in the table below.

Table 4. Data Normality Test Results

Variable	<i>Kolmogorov-Smirnov</i>	p-Value	Sig	Status
Learning outcomes kel. PBL (A1)	0,095	0,200	p>0,05	Normal
Learning outcomes kel. Conventional (A2)	0,136	0,195	p>0,05	Normal

The results of test calculations *Kolmogorov-Smirnov*, it is known that the p-value of all data is greater than (p> 0.05), so that overall the data is determined to have a normal distribution or have a normal distribution of data. A pre-requisite analysis test in the form of a homogeneity test was carried out to determine whether the data from the population had homogeneous variance. A homogeneity test was carried out using *Levene Test*. The following are the results of the homogeneity test:

Table 5. Summary of Homogeneity Test Results

Variation	Levene Test	p-Value	Sig	Status
Student learning outcomes in terms of the learning model	3,115	0,079	p>0,05	Homogeneous
Student learning outcomes in terms of learning motivation	2,173	0,170	p>0,05	Homogeneous

The results of test calculations *Levene Test*, it is known that all the p-value was greater than ($p > 0.05$), so the whole lot coming from a homogeneous sample. The results of the research on hypothesis testing in this study used a two-way ANOVA test with the *SPSS for Windows* program.

Table 6. Anova Test Results

Source	JK	dk	RK	F _o	p-value
Learning model (A)	20,455	1	20,455	5,769	0,021
Learning motivation (B)	29,455	1	29,455	8,308	0,006
Interaksi (AB)	81,818	1	81,818	23,077	0,000
Error	141,818	40	3,545		
Total	24950,000	43			

The results of the analysis obtained value of $F_{oA} = 5.769$ with a p-value of 0.021. While the F_{table} at a significance level of 5% with df ($v=1$ and $n=40$) is 4.08. Due to $F_{oA} > F_{table}$, namely $5.769 > 4.08$ with $p < 0.05$, then H_0 is rejected, meaning that there is an effect of different learning models on student learning outcomes. Thus there is a significant impact from the application of the PBL learning model on student learning outcomes. The results of the analysis obtained the value of $F_{oAB} = 23.077$ with a p-value of 0.00. while the F_{table} at a significance level of 5% with df ($v=1$ and $n=40$) is 4.08. Due to $F_{oAB} > F_{table}$ which is $23.077 > 4.08$ with $p < 0.05$, then H_0 is rejected, meaning that there is an interaction between the learning model and learning motivation on student learning outcomes. The significant ANOVA test results were then continued with the further ANOVA test using the *Tukey Test*.

Table 7. Anova Advanced Test Results with *Tukey Test*

Between groups	Tukey	p-value	Information	Decision
A1B1 – A2B1*	4,091	0,000	Significant	A1B1 > A2B1
A1B2 – A2B2*	-2,364	0,038	Significant	A1B2 < A2B2

The results of the *Tukey Test* between the A1B1 group (PBL model and high learning motivation) with the A2B1 group (conventional and high learning motivation) obtained the Tukey value = 4.091 with $p < 0.05$ accepted at the 5% significance level, the students who were given the PBL learning

model and had high learning motivation is more effective in improving learning outcomes than conventional learning models and high learning motivation. PBL class students who have high learning motivation get higher learning outcomes (26,545) than students with conventional learning models and have high learning motivation (22.455).

The results of the *Tukey Test* between the A1B2 group (PBL model and low learning motivation) with the A2B2 group (conventional and low learning motivation) obtained the Tukey value = -2,364 with $p < 0.05$ accepted at a significance level of 5%, the students who were given the conventional learning model and having low learning motivation has higher learning outcomes than the PBL learning model and low learning motivation. Conventional class students who have low learning motivation get higher learning outcomes (23.545) than students who are given the PBL learning model and have low learning motivation (22.182).

DISCUSSION

The results of the first hypothesis test with ANOVA obtained $F_{oA} > F_{table}$ (5.769 > 4.08) with $p < 0.05$ accepted at a significance level of 5%, meaning that there was a difference in learning outcomes between students who received the *Problem Based Learning* model treatment (PBL) and students who received conventional learning models. Students with the PBL learning model obtained an average score of 24,364, higher than the conventional learning model (23,000). This means that the first hypothesis is accepted that the learning outcomes of Light Vehicle Maintenance Engineering (PMKR) students taught using the PBL learning model were higher than students taught by conventional learning models.

The PBL Learning Model is a method that is suitable to be used in teaching fairly complex material and solving problems encountered in conducting practicum in PMKR lessons. In the implementation, students are given problems and discussed in small groups. Because the stages of applying the model are able to stimulate and hone students' abilities. This is in line with the results of previous studies which showed the influence of the PBL model on students' critical thinking skills (Pebriyani & Pahlevi, 2020).

Conventional is traditional, so the conventional model is a model in the teaching and learning process that applies the old ways, but requires a longer time for students so that it is difficult to achieve curriculum targets. Conventional learning is learning that is dominated by the teacher as a "transfer" of knowledge, while students are more passive as "recipients" of knowledge (Sukandi, 2003). Therefore, the learning outcomes of students who are taught using the conventional model are lower because students are less active in honing their abilities.

The results of the second hypothesis test with ANOVA obtained $F_{oAB} > F_{table}$ (23.077 > 4.08) with $p < 0.05$ accepted at a significance level of 5%, meaning that the interaction between learning models and learning

motivation has a significant effect on learning outcomes for light vehicle engine maintenance. student. This means that the second hypothesis is accepted that there is an interaction between the learning model and learning motivation on the learning outcomes of light vehicle engine maintenance. Learning outcomes. According to Indria & Ramadhan, student learning outcomes are the result of the interaction of various factors that affect both the environment and the students themselves (Khasanah & Lestari, 2021). One of the factors that comes from within students is learning motivation, motivation is a driving force that arises from within a person to learn and understand what is being studied (Adriana & Sudibjo, 2017). Because learning outcomes can be influenced by the learning model and learning motivation factors, this is in line with research findings where there is an interaction between the learning model and student learning motivation on PMKR results.

The result of the third hypothesis with Tukey Test showed the students who have the motivation to learn high-taught model PBL learning and motivation high learning is more effective in improving learning outcomes compared to conventional learning models As for the test results of the fourth hypothesis by Tukey test students who have low learning motivation those who are taught using the conventional learning model have higher learning outcomes than the PBL learning model. The findings of the third and fourth hypothesis tests, it supports the theory where the selection of learning models must be in accordance with the characteristics of students so that learning is right on target (Rizkia & Zaedi, 2019). Learning outcomes can be achieved optimally if learning is given with a variety of learning models, the use of PBL can be an alternative. Then in the application, it is necessary to pay attention to the learning motivation of each student, so that learning will be more successful

CONCLUSION

The conclusion in this study is that there are differences in learning outcomes between students who receive the treatment of Problem Based Learning (PBL) learning models and students who receive conventional learning models. There is an interaction between the learning model and learning motivation. Students who have high learning motivation are more suited to the PBL model, while students who have low learning motivation are more suited to using the conventional model. The implication of this research is that the results of the research can be used as reference material for teachers in designing a lesson

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