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The Effect of The PJBL Learning Model Assisted by Google Sites Media on Student Learning Outcomes in DDTE Subjects

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Abstract **- The problem in this study is the lack of student interest in learning and the lack of student participation in the learning process which has an impact on student learning outcomes in subject of Basic of Electronics Engineering (DDTE). The purpose of this study is to determine the influence of the Project Based Learning model assisted by Google Sites media on student learning outcomes in the subject of Basic of Electronics Engineering at SMK N 1 Tanjung Raya. This type of research is an experiment with a one-group pretest posttest research design. The number of samples in this study is 12 students of class X Electrical Engineering (TE) State Vocational High School (SMK N) 1 Tanjung Raya. The data analysis technique used is the paired T Test. The results of the research were that the pretest score was obtained with an average score of 65.42, while the posttest score received an average score of 73.75. The results of the hypothesis calculation show that the sig (2-tailed) is 0.005 and less than (α = 0.05) and the calculation is greater than the ttable (3.458 >1.796), then Ha is accepted and Ho is rejected. So it can be concluded that there is an influence of the use of the PjBL learning model assisted by Google Sites learning media on the Learning Outcomes of Class X TE Students in DDTE Subjects at SMKN 1 Tanjung Raya.**

Keywords **- Project Based Learning, Google Sites, Learning Outcomes.**

I. INTRODUCTION

Education is the most important thing for human life, this means that every Indonesian citizen has the right to get it and is expected to always develop in it. Education in general means a life process in developing each individual to be able to live and survive [1]. Education also has a central role in the development of a nation, through education, individuals are given the opportunity to develop their potential and make positive contributions to society [2].

The digital era marks a profound change in the way we learn and teach. Information technology has changed the educational landscape, introducing various innovations in the learning process. The increasingly rapid development of information technology requires every organization, including the education sector, to be able to implement it. Traditional learning models have encountered various challenges in dealing with the complexity of learning needs in this digital era. Therefore, a learning approach that is innovative and relevant to current developments is needed to increase the effectiveness and attractiveness of learning.

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Based on the author's observations at State Vocational High School (SMK N) 1 Tanjung Raya, several problems were found in the learning process, namely the lack of student participation and interest in learning. This phenomenon has a negative impact on student learning outcomes. Learning outcomes are changes that occur within students as a result of the learning process that has been implemented. Learning outcomes are an indicator of the success of the educational process, where students not only acquire new knowledge, but are also able to apply it in real situations, show positive changes in attitudes, and improve relevant skills.

Learning outcomes can be said to be achievements or accomplishments obtained by students after completing a number of learning materials [3]. Data on Midterm test Scores for students in the Basic of Electronics Engineering (DDTE) subject for the 2024 - 2025 academic year shows that student learning outcomes only obtained an average score of 53 which does not meet the Criteria for Completion of Learning Objectives at SMK Negeri 1 Tanjung Raya, namely 70.

Furthermore, based on classroom observations, it was revealed that only around 30% of students actively participated in class discussions and learning activities. Most students tend to be passive and do not show enthusiasm in participating in learning. Observations made on students show that 70% of them feel less interested in the learning methods currently used. Lack of student participation and interest in learning can be caused by various factors, including learning methods that are less interesting and only focus on the teacher. Therefore, innovation is needed in learning methods that can increase student participation and interest, so that learning outcomes can be improved. One learning method that has been proven effective in increasing student participation and interest is Project Based Learning (PjBL) .

Project-Based Learning is a learning approach that emphasizes learning through working on challenging authentic projects or assignments. In project-based learning, students are given the opportunity to study subject matter in depth through direct experience in completing interesting projects. Project Based Learning is an innovative learning model that uses projects/activities as a learning medium, so that it can actively involve students in the learning process and problem solving activities, and students can work in groups and produce a valuable product [4].

Project Based Learning has the following steps: (1) determining basic questions; (2) designing project plans; (3) preparing a schedule; (4) monitoring student and project progress; (5) checking results; (6) and evaluating experience[5]. In the project-based learning model students are introduced to a challenge or given a project related to the material being studied [6]. There are several advantages of the PjBL learning model if this model can be applied to students, including: (1) making students motivated to learn in making projects; (2) make students more creative in learning and able to solve problems; (3) increasing collaboration, namely students need to work together in groups and are able to create a pleasant atmosphere; (4) as well as creating scientific attitudes such as thoroughness, honesty, responsibility and creativity [7].

However, implementing PjBL alone may not be enough to achieve optimal learning outcomes. The use of innovative and technology-based learning media also needs to be implemented to foster students' interest in participating in the learning process. With the existence of learning media, interest and desire to learn and motivation to learn so that students are more enthusiastic about learning, and learning media can foster a sense of curiosity about learning, because without interest and motivation to learn the learning process will not be achieved.[8]. Media not only aids teachers in communicating their lessons but also adds value to the learning activities [9].

Google Sites, as a technology-based learning media, offers various features that can support the implementation of PjBL. Google Sites is a product created by Google in the form of a learning media platform that makes it easier for students to access information, in this case subject matter. The ease of accessing information means that Google Sites-based learning media can be developed more easily than other learning media [10]. stated that learning media using Google Sites makes it very easy for students to use, besides that it also doesn't drain their internet quota [11].

Google Sites has main features that can be used as learning media. The features introduced consist of three parts, namely, inserts, pages and themes. The insert section consists of four menus, namely Text box, Images, Embed, and Drive. Text boxes are used to insert text on a page (interface)[12]. The Basics of Electronics Engineering subject acts as the main foundation in introducing students to basic concepts in the field of electronics. With this, students gain the basic knowledge needed to understand more complex material in the field of electronics engineering, but there are still challenges in providing interesting and relevant learning for students. Lack of student interest and difficulties in connecting theoretical concepts with practical applications are some of the problems that need to be resolved.

Therefore, this research aims to explore the influence of the PjBL learning model assisted by Google Sites-based learning media on student learning outcomes in the Basics of Electronics Engineering subject. Thus, it is hoped that this research can contribute to the development of innovative and effective learning approaches to improve the quality of electronics engineering education in this digital era.

II. METHOD

This research is a type of pre-experimental research with the research design used is "one group pretest-posttest". In One-Group Pretest-Posttest Design the dependent variable is measured as one group before (pretest) and after (posttest) a treatment is given. After a treatment is given to the group, the values before and after the treatment are compared [13]. In this study, the subjects of the study were class X Electronic Engineering students at SMK Negeri 1 Tanjung Raya in the 2024-2025 academic year who were made an experimental class with a total of 12 people.

TABLE I
DESAIN ONE GROUP PRETEST POSTTEST

O1	X	O2

O1 = Preliminary Test before using the PjBL Learning Model with the help of Google Sites Media
X = Use of PjBL Learning Model with the help of Google Sites Media
O2 = Final Test after using the PjBL Learning Model with the help of Google Sites Media

The instrument used in this research was a test. In this research, data will be collected through the results of written cognitive ability tests in the form of diagnostic assessments (pretest) and summative assessments (posttest). The data that has been taken was tested for normality using the Shapiro-Wilk test method. In the use of parametric and non-parametric statistical tests, it is necessary to carry out analysis requirements tests. Testing with parametric inferential statistical tests requires normality tests [14]. If the data is normally distributed, the hypothesis is then tested using the Paired Sample T-test to compare the average of the pretest and posttest scores.

III. RESULTS AND DISCUSSION

The research was conducted on class In this research, Google Sites is used as a learning medium to provide material resources. This research uses a one-group pretest-posttest design, where before treatment is given, a pretest is carried out to measure students' initial abilities. After PJBL-based learning takes place, a posttest is carried out to measure improvements in student learning outcomes. The pretest and posttest scores were then analyzed to see the effect of the PJBL learning model assisted by Google Sites on learning outcomes.

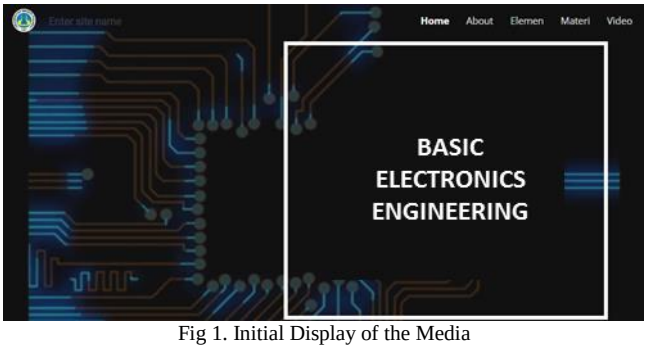

Fig 1. Initial Display of the Media

A. *Data Description*

Based on the research data, descriptive statistical data was obtained (mean, median, range and standard deviation) which were processed using the IBM SPSS statistics 25 application.

1) Pretest Results

The following are the results of calculating the pretest results as seen from the table 2.

TABLE II
STATISTICAL DESCRIPTION OF PRETEST RESULTS

Statistics		
Pretest		
N	Valid	12
	Missing	0
Mean		65,4167
Median		67,5000
Std. Deviation		12,51514
Variance		156,629
Range		40,00
Minimum		45,00
Maximum		85,00
Sum		785,00

Based on the results of the data description shown in table 2 and the average student pretest score is 65.42 with the lowest score range being 45.00 to the highest score of 85.00, the variance is 156.629 and the standard deviation is 12.51. Next, Table 3 shows the calculation with certain provisions of the value, the frequency of the number of students who answered and the percentage.

TABLE III
FREQUENCY OF PRETEST RESULTS

Pretest					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	45.00	1	8.3	8.3	8.3
	50.00	1	8.3	8.3	16.7
	55.00	2	16.7	16.7	33.3
	60.00	1	8.3	8.3	41.7
	65.00	1	8.3	8.3	50.0
	70.00	2	16.7	16.7	66.7
	75.00	2	16.7	16.7	83.3
	80.00	1	8.3	8.3	91.7
	85.00	1	8.3	8.3	100.0
	Total	12	100.0	100.0	

Based on Table 3, the data can be presented in graph/histogram form as follows:

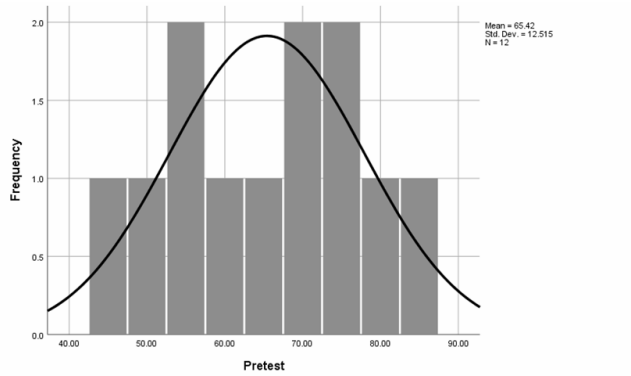

Fig 2. Pretest Score Distribution Graph

2) Posttest Results

The following are the results of calculating the posttest results as seen from the table:

TABLE IV
STATISTICAL DESCRIPTION OF PRETEST RESULTS

Statistics		
Posttest		
N	Valid	12
	Missing	0
Mean		73.7500
Median		75.0000
Std. Deviation		7.72393
Variance		59.659
Range		25.00
Minimum		60.00
Maximum		85.00
Sum		885.00

Based on the results of the data description shown in table 9 and table 10, the average posttest score for students is 73.75 with the lowest score range being 65.00 to the highest score of 85.00, the variance is 59.65 and the standard deviation is 7.72. Next, Table 5 shows the calculation with certain provisions of the value, the frequency of the number of students who answered and the percentage.

TABEL V
FREQUENCY OF POSTTEST RESULTS

Posttest					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	60.00	2	16.7	16.7	16.7
	70.00	2	16.7	16.7	33.3
	75.00	4	33.3	33.3	66.7
	80.00	3	25.0	25.0	91.7
	85.00	1	8.3	8.3	100.0
	Total	12	100.0	100.0	

Based on Table 5, the data can be presented in graph/histogram form as follows:

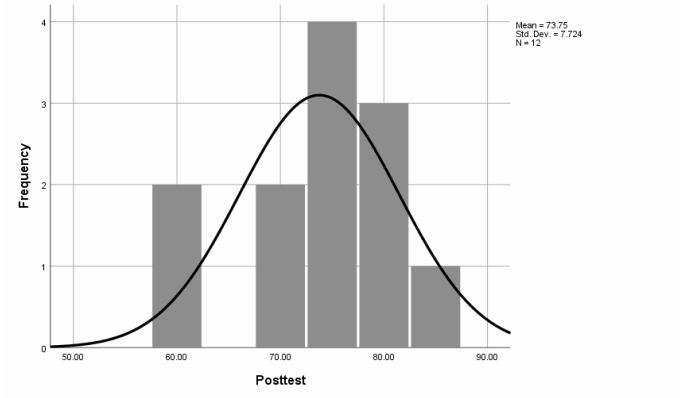

Fig 3. Posttest Score Distribution Graph

B. *Data analysis*

1) *Normality Test*

The Normality Test is used to determine whether the data is normally distributed or not in the pretest and posttest results. The researcher carried out the Shapiro-Wilk normality test using the IBM SPSS statistics 25 application to analyze the data from the pretest and posttest results. The following are the results of normality testing.

TABLE VI
NORMALITY TEST

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Say.	Statistic	df	Say.
Pretest	.143	12	.200*	.967	12	.878
Posttest	.231	12	.077	.898	12	.148

Based on table 6, it can be concluded that the data is normally distributed as evidenced by the significance results in the pretest and posttest which are higher than the significance of the table ($\alpha = 0.05$). The significance value for the pretest results is 0.878, while for the posttest it is 0.148, where the results are greater than $\alpha = 0.05$.

2) *Hypothesis Testing*

In this study, researchers used a paired t test using the IBM SPSS statistics 25 application. The paired t test was used to determine whether there was a difference between the students' pretest results and posttest results.

Ha = PjBL learning model assisted by Google Sites produces higher results in student learning outcomes.

Ho = PjBL learning model with the help of Google Sites media does not produce higher results on student learning outcomes.

If tcount > ttable or the significance level is <0.05, then Ha is accepted and Ho is rejected, meaning that the PjBL learning model assisted by Google Sites produces higher results in student learning outcomes. If tcount < ttable or the significance level is > 0.05, then Ha is rejected and Ho is accepted, meaning that the PjBL learning model assisted by Google Sites media does not produce higher results in student learning outcomes. The results of the hypothesis test are as follows

TABLE VII
HYPOTHESIS TEST

Paired Samples Test							
		Paired Differences			T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean			
Pair 1	Pretest - Posttest	-8.33	8.34	2.41	-3.458	11	.005

Table 7 shows that the sig (2-tailed) is 0.005 and is smaller than ($\alpha = 0.05$) and tcount is greater than ttable (3.458 > 1.796), so Ha is accepted and Ho is rejected. So it can be concluded that there is an influence of the use of the PjBL learning model assisted by Google Sites learning media on the learning outcomes of Class X TE students in the Basics of Electronics Engineering subject at SMKN 1 Tanjung Raya. Moreover, the results of this research are in line with research by Irfan & Yahya (2018) regarding the Effect of Implementing the PjBL Learning Model on Learning Outcomes in TKBGT Subjects of Class while the control class got an average score of 72.47. The results of calculating the hypothesis at a significant level of $\alpha = 0.05$ show that tcount > ttable, namely 3.65 > 2.05, because tcount is greater than ttable, the alternative hypothesis (Ha) is accepted. It can be concluded that at a real level, this research shows that there is a significant influence on student learning outcomes using the Project Based Learning learning model in the Workshop Work Engineering and Technical Drawing subjects for class X Mechatronics Engineering students at SMK Negeri 1 West Sumatra[15].

Further relevant research has been conducted by Ningsih & Bukit (2022) The results of the study indicate that there is an influence of the Use of Google Sites on Student Learning Outcomes in Newton's Law Material for Class X MAS PAB 1 Sampali with an average pretest score of 48.33 with a standard deviation of 18.95. While for the posttest score, an average of 82.67 was obtained with a standard deviation of 11.72. Learning using Google Sites media provides benefits to the research sample because it can be accessed using the website without having to download the application so that it can save the existing quota[16].

IV. CONCLUSIONS

Based on the research findings, the Project Based Learning (PjBL) model assisted by Google Sites significantly improves student learning outcomes in DDTE subjects at SMKN 1 Tanjung Raya. The average pretest score of 65.42 increased to 73.75 in the posttest, demonstrating a meaningful enhancement in students' understanding and performance. The hypothesis analysis further validates these results, with a significance value (sig 2-tailed) of 0.005 being lower than the α level of 0.05 and a t-value of 3.458 exceeding the critical t-table value of 1.796. Consequently, the alternative hypothesis (Ha) is accepted while the null hypothesis (Ho) is rejected, confirming the positive impact of integrating Google Sites into the PjBL model. This study contributes to the educational field by showcasing the effectiveness of digital tools in facilitating interactive and engaging learning environments, particularly in technical and electronic education.

However, the research has several limitations, including a small sample size of only 12 students from a single institution, which may limit the generalizability of the results to a wider population. Additionally, the study lacked a control group, making it difficult to isolate the effects of the PjBL model assisted by Google Sites from other potential influencing factors. For future research, it is recommended to involve a larger and more diverse sample size and include control groups to provide more robust and generalizable findings. Further studies could also investigate additional variables such as student engagement, motivation, and long-term retention of knowledge to gain deeper insights into the factors that enhance the effectiveness of technology-assisted PjBL in various educational contexts.

REFERENCE

[1] Yayan. , S. W. A. Pd. , U. Wiharti. , N. M. Soleha. Alpian, "Pentingnya Pendidikan Bagi Manusia," vol. 1, pp. 66–72, 2019.

[2] H. Soeratin, A. I. Fanani, U. Islam, N. Sunan, and G. D. Abstract, "Digital Leadership di Era Multieduhealthtainment 5.0 : Transformasi Peningkatan Mutu Pendidikan di Madrasah," *Jurnal Ilmiah Wahana Pendidikan*, no. 16, pp. 312–318, 2023, doi: 10.5281/zenodo.8240331.

[3] W. Sulikah, A. Setyawan, and T. Citrawati, "Identifikasi Hasil Belajar Siswa Muatan IPA Materi Perubahan Wujud Benda Kelas V SDN Socah 4," 2020.

[4] V. Melinda and M. Zainil, "Penerapan Model Project Based Learning untuk Meningkatkan Kemampuan Komunikasi Matematis Siswa Sekolah Dasar (Studi Literatur)," vol. Volume 4, pp. 1526–1539, 2020.

[5] U. Azzahra, F. Arsih, and H. Alberida, "Pengaruh Model Pembelajaran Project-Based Learning (PjBL) Terhadap Keterampilan Berpikir Kreatif Peserta Didik Pada Pembelajaran Biologi: literature review," 2023. [Online]. Available: https://journal.moripublishing.com/index.php/biocheph y

[6] R. Adony Natty, F. Kristin, I. Anugraheni, U. Kristen Satya Wacana, and J. Tengah, "Peningkatkan Kreativitas Dan Hasil Belajar Siswa Melalui Model Pembelajaran Project Based Learning Pada Siswa Sekolah Dasar," 2019. [Online]. Available: https://jbasic.org/index.php/basicedu

[7] D. Puji Hartono and S. Asiyah, "PjBL Untuk Meningkatkan Kreativitas Mahasiswa: Sebuah Kajian Deskriptif Tentang Peran Model Pembelajaran PjBL Dalam Meningkatkan Kreativitas Mahasiswa," 2019.

[8] H. Ndraha and A. R. Harefa, "Pentingnya Media Pembelajaran dalam Meningkatkan Minat dan Motivasi Belajar Siswa di SMP Negeri 2 Gunungsitoli Utara," *Journal on Education*, vol. 06, no. 01, pp. 5328–5339, 2023.

[9] A. Mahendra, "Design and Implementation of Interactive Learning Media using SAC 3 Application for Basic Electronics Subject at State Vocational High School 5 Padang," 2024, doi: 10.18782/ijecl.

[10] J. Japrizal and D. Irfan, "Pengaruh Penggunaan Media Pembelajaran Berbasis Google Sites Terhadap Hasil Belajar Siswa Pada Masa Covid-19di Smk Negeri 6 Bungo," *JAVIT : Jurnal Vokasi Informatika*, Oct. 2021, doi: 10.24036/javit.v1i3.33.

[11] H. Sapulete, A. Priakusuma, E. Markiano Solissa, I. Dwi Aristy Putri, and K. Mere, "Efektivitas Penggunaan Media Google Site dalam Meningkatkan Hasil Belajar Peserta Didik," vol. 5, 2023.

[12] E. N. E W Kasih, R. Ramdanni Azahra, and S. P. Prantinus Kaban, "Alternatif Pengelolaan Pembelajaran Dalam Jaringan: Google Sites,"2022.[Online].Available: https://madaniya.pustaka.my.id/journals/contents/article /view/280

[13] William and Hita, "Mengukur Tingkat Pemahaman Pelatihan PowerPoint Menggunakan Quasi-Experiment One-Group Pretest-Posttest," vol. 20, pp. 1–5, 2019.

[14] R. Sianturi, "Uji homogenitas sebagai syarat pengujian analisis," *Jurnal Pendidikan, Sains Sosial, dan Agama*, vol. 8, no. 1, pp. 386–397, Jul. 2022, doi: 10.53565/pssa.v8i1.507.

[15] S. A. Yahya and D. Irfan, "Pengaruh Penerapan Model Pembelajaran Pjbl Terhadap Hasil Belajar Mata Pelajaran TKBGT Siswa Kelas X Teknik Mekatronika Smk Negeri 1 Sumatera Barat," *E - ISSN: 2302-3295*, vol. Vol. 6, No. 2, 2018.

[16] P. Ningsih and N. Bukit, "Pengaruh Penggunaan Media Pembelajaran Google Sites Terhadap Hasil Belajar Siswa Sma Pada Materi Hukum Newton," *Jurnal Pendidikan Fisika*, vol. 11, no. 2, p. 97, Dec. 2022, doi: 10.24114/jpf.v11i2.36669.