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Implementation of Google Sites as E-Learning to Improve Student Learning Outcomes

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ABSTRACT

The advancement of information technology has brought about substantial transformations in the world of education, especially through the implementation of digital learning media such as e-learning. However, learning in this element is still carried out conventionally so that student learning outcomes have not reached the minimum completion criteria. This study aims to examine the effectiveness of utilizing Google Sites-based e-learning in improving student learning outcomes in the material of Building Utilities Construction Drawings in class XI DPIB Vocational School 1 Percut Sei Tuan in the 2024/2025 academic year. Using the Classroom Action Research (CAR) framework, this study was carried out through two cycles, each covering the planning, implementation, observation, and reflection stages. Data were collected through multiple-choice tests in each cycle and analyzed using descriptive statistics and t-testsThe outcomes highlighted a substantial advancement in student performance, with the mean score showing improvement from 69.5 in the first cycle to 87.1 in the second cycle, while the learning completion rate increased from 57.14% to 92.85%. Statistical analysis confirmed a significant difference between the two cycles. The study concludes that the adoption of Google Sites-based e-learning is effective in supporting student understanding and engagement. The study's conclusion states that Google Sites learning media can be a valuable tool in the teaching and learning process, particularly for vocational education in the Building Utilities Construction material.

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1. INTRODUCTION

Educational advancement has been markedly shaped by the rapid progress of information and communication technology. Evidence of this significant development in education is the emergence of *e-learning* . As explained by Gilbert & Jones and Michael, *e-learning* is any form of learning activity that utilizes electronic media. This definition focuses on the use of all forms of electronic devices to assist people in learning. Today, the world of education is experiencing rapid development accompanied by increasingly diverse challenges, encouraging the expansion of interactions between educators and students beyond the classroom (Firdaus et al., 2025) . In the realm of vocational learning, technology plays a key role in facilitating digital communication and collaboration beyond traditional learning approaches. This continued until the discovery of *e-learning methods* , which can help students overcome these limitations.

Technology in vocational learning plays a crucial role in increasing student engagement and facilitating access to learning materials. Integrating interactive media, including e-books equipped with QR code links to instructional videos and scientific articles, fosters a more engaging and accessible learning process that aligns with students' needs (Rahayu et al., 2021). This innovation not only strengthens understanding of the material, but also equips students with skills in using technological devices and applications, so that obstacles that often arise in conventional learning can be minimized (Fauzie et al., 2024) . E-Learning is a learning approach designed by utilizing technology as the primary means, so that the process of achieving learning objectives can take place without the need for direct meetings between educators and students in the same location, so learning can be done anywhere (O'Neill, 2024) . Furthermore, *e-learning* is seen as a learning method that takes place entirely remotely, by utilizing electronic-based technology, especially the internet network, as the primary means to establish interactions between educators, students, and learning resources (Nurwulan et al., 2022).

The majority of students at Vocational School 1 Percut Sei Tuan actively use smartphones, allowing them easy access to a variety of learning applications and platforms. However, they still face challenges in maximizing their use of this technology. However, there are still barriers in their skills to use the technology to its full potential. According to the findings obtained from classroom observations and interviews with subject teachers in the Building Modeling and Information Design Expertise Program at Vocational School 1 Percut Sei Tuan, it is known that the number of class XI Building Information and Modeling Design (DPIB) students is 30 people. However, the assessment of assignments and exams on the Building Utilities Construction Drawing element shows that student learning achievement is still uneven, which can be seen in **Table 1.**

Table 1. Learning Outcomes of GKUG Elements for the 2023/2024 Academic Year

School year 2023/2024			
Mark	**Number of Students**	**Percentage (%)**	**Information**
<75	15	50	Less Competent
75-84	9	30	Quite Competent
85-94	2	6.67	Competent
95-100	4	13.33	Very Competent
Total	**30**	**100**	

Analysis of the learning outcomes table shows that in the Building Utilities Construction Drawing material, half of the 11th grade students, namely 15 people, still obtained scores below the Minimum Completion Criteria standard of 75. A total of 9 students or 30% achieved scores between 75 and 84, then 2 students (6.67%) were in the range of 85-94, while the other 4 students (13.33%) achieved the highest score in the range of 95-100. Based on this situation, there is a need to develop e-learning media at Vocational School 1 Percut Sei Tuan to enhance the learning process and improve student achievement. Referring to the problem, the main point of this research lies in the low learning outcomes of students in the Building Utilities Construction Drawing material in class XI DPIB Vocational School 1 Percut Sei Tuan.

This research is directed to examine the extent to which the implementation of Google Sites-based *e-learning* can contribute to improving learning outcomes in this material. Google Sites was chosen because it has several advantages compared to other e-learning platforms. This platform is free, lightweight, easy to use, and integrated with other Google services such as Drive, Forms, and YouTube. The simple interface makes it easy for vocational school students who are not yet accustomed to complex LMS, and can be accessed both via smartphone and computer without additional applications. This is in accordance with the conditions of Vocational School 1 Percut Sei Tuan students, most of whom are accustomed to using mobile devices.

Although the use of Google Sites as an e-learning medium has been widely researched, most studies are still limited to general academic contexts for example, Almendo Thio found that Google Sites-based media effectively increased the motivation of students in learning and academic achievement (Rahayu et al., 2021), while (Savitri, 2025) reported an increase in learning outcomes and engagement of vocational high school students after implementing Google Sites with Project-Based Learning. This study provides a new contribution by focusing on the Building Utilities Construction Drawing element in vocational high schools, thereby strengthening empirical evidence regarding the effectiveness of Google Sites in the context of vocational technical education. Thus, the goal to be achieved is to improve and enhance student learning outcomes through the use of Google Sites-based e-learning on the Building Utilities Construction Drawing element in class XI DPIB Vocational School 1 Percut Sei Tuan in the 2024/2025 academic year.

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Learning is a mental and psychological process that occurs through an individual's active engagement with their environment, resulting in relatively permanent changes in knowledge, skills, and attitudes (Ramadhan & Iriani, 2022) . The learning process not only adds new information but also creates behavioral changes that can be applied in everyday life (Festiawan, 2020) .

Learning outcomes refer to the level of student mastery of the material that includes knowledge, skills, and attitudes, obtained through learning activities (Kurniawan & Sudarso, 2020) . In learning, changes that occur in student behavior due to this learning are relatively permanent and can be applied in everyday life as a result of interaction with the learning environment (Harefa, 2020) . Learning outcomes include changes in cognitive, affective, and psychomotor aspects that describe the extent to which students master the learning material and their ability to apply appropriate technical practices. Thus, the use of Google Sites-based e-learning has the potential to improve the learning achievement of class XI DPIB students in the Building Utilities Construction Drawing material at Vocational School 1 Percut Sei Tuan.

2. METHOD

The study was carried out at Vocational School 1 Percut Sei Tuan, located on Jalan Kolam No. 3, Kenangan Baru, within the Percut Sei Tuan District of Deli Serdang Regency, North Sumatra. It was implemented in the even semester of the 2024/2025 academic year, with participants consisting of 11th-grade students of DPIB who were studying the Construction Drawing and Building Utilities material. This research focused on the use of Google Sites-based e-learning as a learning medium to improve student learning achievement in the material.

The method used is Classroom Action Research (CAR), which is a method that aims to observe and improve the learning process through actions carried out repeatedly in several cycles (Machali, 2022) . By using PTK, teachers can conduct continuous evaluations and adjust learning strategies so that student learning outcomes can improve significantly. (MA Ramadhan et al., 2022) . This study focuses on the learning process and student learning outcomes in the classroom. The research implementation follows the Kemmis and McTaggart (1998) model, with a cycle model consisting of planning, implementation, observation, and evaluation stages used to continuously improve the quality of the learning process and outcomes (Rabgay & Kidman, 2023).

Data collection is a crucial stage that must be carefully prepared before the research begins, as the success of the research depends heavily on the data obtained. Selecting an appropriate data collection method will produce valid and reliable data to answer research questions and test hypotheses (Sugiyono, 2021) . In this study, data were collected through written tests to measure students' cognitive learning outcomes, using an objective test instrument administered at the end of each learning cycle. The data obtained were quantitative and analyzed using descriptive percentage techniques.

The test consisted of 40 multiple-choice questions, divided into 20 questions for each cycle. Prior to the test, a question grid was prepared as a reference for creating questions for each cycle. Data analysis was performed using the t-test, a parametric statistic frequently used in hypothesis testing, especially when the population variance is unknown. The t-test is a statistic commonly encountered in various practical statistical problems (Paisal et al., 2021) .

The results of the instrument tests analyzed using several techniques show that from the test validity , with point biserial correlation test used because the point biserial correlation value meets the criteria rcount > rtable (Arikunto, 2021) 15 valid questions and 5 invalid questions were obtained in both cycles. Reliability calculated using the Kuder Richardson formula (KR-20) was 0.70 in cycle I and 0.79 in cycle II, both of which are in the high category, so the instrument is consistent and reliable (Sugiyono, 2021) . Analysis of the level of difficulty using the proportion of correct answers shows that the questions are dominated by the medium category, with 5 easy and 10 medium questions in cycle I and 14 medium and 1 difficult question in cycle II.

Power test calculated using the discrimination index showed that the quality of the questions was quite good, with 1 being very good, 9 being good, and 5 being adequate in cycle I, and 12 being good and 3 being adequate in cycle II. Meanwhile, the effectiveness of the distractors, analyzed based on the distribution of answer choices, showed that most distractors functioned well because they were selected by more than 5% of participants. Thus, the instrument used can be declared valid, reliable, and appropriate for measuring student learning outcomes.

3. RESULTS AND DISCUSSION

In this study, the learning process was implemented through two cycles, Each cycle was organized into four phases, namely planning, implementation, observation, and reflection. The first cycle included two meetings with the implementation of Google Sites-based e-learning media on electrical installation material. In the planning stage, preparations were made in the form of compiling modules, evaluation tools, and teaching materials to support learning. The implementation of learning was divided into three phases: opening, core, and closing, which included checking student attendance through Google Sites, delivering material, discussions, and administering pre-tests and post-tests. The integration of digital learning technologies has the potential to enhance students' enthusiasm and engagement in the learning process. Furthermore, interactive learning media creates a more engaging learning environment and facilitates students in accessing learning materials autonomously. (Widiastari & Puspita, 2024) .

During the process, Classroom observations were carried out to examine student activities and evaluate the effectiveness of the learning media. The post-test results in the first cycle showed that 57.14% of students had achieved the minimum completion standard with an average score of 69.5, while 42.86% of students had not met this criterion.

This data indicates that overall learning outcomes are not optimal, so a second cycle is needed to improve student competency as shown in **Table 2.**

Table 2. Post-Test Results Values of GKUG Elements Cycle I

2024/2025 Academic Year			
Mark	**Number of Students**	**Percentage (%)**	**Information**
<75	12	42.86	Less Competent
75-84	9	32.14	Quite Competent
85-94	7	25	Competent
Amount	**28**	**100**	
Completion Percentage (%)		**57.14**	
Percentage of Incomplete (%)		**42.86**	

Based on the data in the table, from the 15 multiple-choice questions given to students in the post-test, it can be seen that 57.14% of students successfully achieved learning completion, while 42.86% did not meet the criteria. In terms of individual completion, 16 students were declared to have passed with an average score of 69.5. However, several students still did not reach the KKM score so that overall learning outcomes in the classroom did not meet the competency standards. Therefore, the implementation of the second cycle is needed to optimize student academic results in the GKUG learning element.

To achieve optimal learning outcomes, improvements were made after the first cycle with several strategic steps. Teachers actively monitored and assisted students throughout the learning process and provided solutions to various obstacles they encountered. Students were also expected to improve their concentration, particularly on drawing electrical installations in simple homes. Furthermore, post-test results were comprehensively analyzed to identify areas of the material that still posed challenges for students. Then, discussions were conducted on the most frequently asked questions and concepts that were not fully understood to further enhance student understanding (Dewi et al., 2021) .

The results of the second cycle post-test showed that the majority of students had met the competency standards, with an individual completion percentage of 92.85% and an average score categorized as competent. **Table 3** indicates that classical completion has been achieved overall, thus the learning was declared successful and the research could be stopped in the second cycle.

Table 3. Post-Test Results Values of GKUG Elements Cycle II

2024/2025 Academic Year			
Mark	**Number of Students**	**Percentage (%)**	**Information**
<75	2	7.14	Less Competent
75-84	8	28.57	Quite Competent

2024/2025 Academic Year			
Mark	**Number of Students**	**Percentage (%)**	**Information**
85-94	12	42.86	Competent
95-100	6	21.43	Very Competent
Amount	**28**	**100**	
Percentage of Completion (%)		**92.86**	
Percentage of Incomplete (%)		**7.14**	

During Cycle II, students' learning outcomes showed a substantial improvement following the application of Google Sites-based e-learning media. This is evidenced by the rise in the average scores and the classical completion rate in the post-test. The average student score increased from 69.5 in Cycle I to 87.1 in Cycle II. Based on these data, the use of this digital Learning media has been shown to be able to improve students' understanding of the Building Utilities Construction Drawing material in class XI DPIB Vocational School 1 Percut Sei Tuan, so this method is effective in supporting the teaching and learning process.

From the distribution with a significance level of 0.05 and degrees of freedom of 56 (28+28), the ttable value is 1.672. The calculated tvalue obtained is 3.485, higher than the ttable value (3.485 > 1.672). Thus, the alternative hypothesis is accepted and the null hypothesis is rejected, which indicates that the implementation of Google Sites-based E-Learning has succeeded in improving student learning outcomes on the material of building utility construction drawings in class XI DPIB Vocational School 1 Percut Sei Tuan. In conclusion, learning outcomes in the second cycle increased by 16.47% as presented in Table 4, which compares students post-test results..

Table 4. Post-Test Result Comparison for the 2024/2025 Academic Term

Information	Cycle I	Cycle II
Average value	69.5	87.1
% Classical Completion	57.14	92.86
%Classical Completion Criteria	75	75

This improvement can be understood through the perspective of constructivism theory, where students actively construct knowledge through independent access to materials on Google Sites. Furthermore, Mayer's multimedia principles suggest that the combination of text, images, and videos reduces cognitive load and enhances understanding. Thus, changes in data distribution indicating an improvement in the learning outcomes of class XI DPIB students of Vocational School 1 Percut Sei Tuan across Cycle I and Cycle I can be observed in **Figure 1** below.

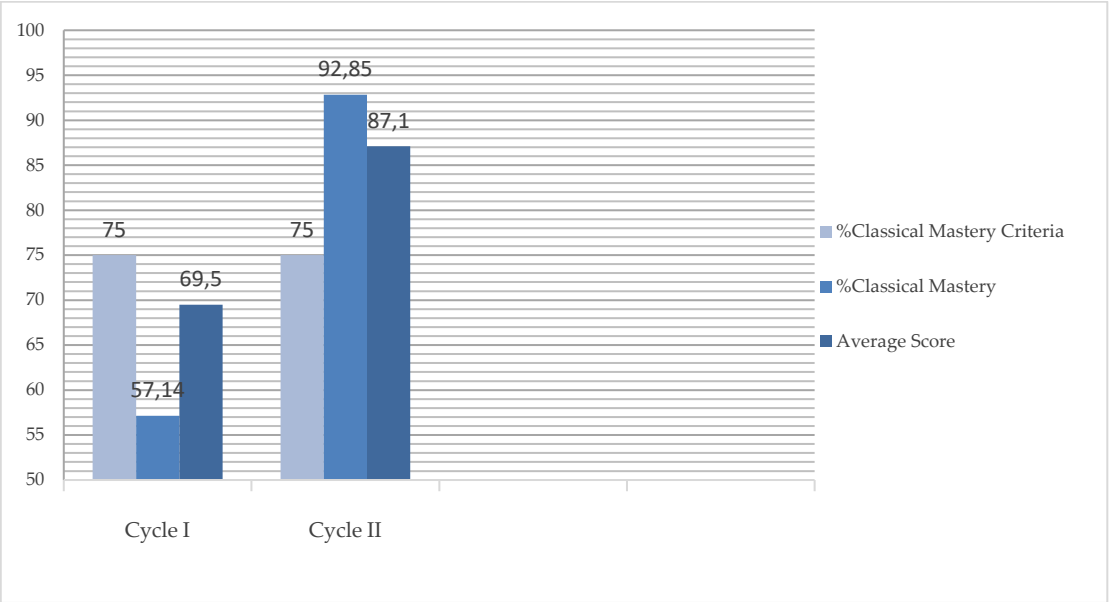

Figure 1. Comparison of Post-Test Results

Based on **Figure 1**, the improvement in learning outcomes from cycle I to cycle II can be explained through learning theory. Constructivism emphasizes that students construct knowledge through experience and interaction, facilitated by Google Sites as a standalone medium. Meanwhile, according to Mayer's multimedia theory, the combination of text, images, and interactivity helps reduce cognitive load and strengthen understanding (Effendi & Wahidy, 2025) . This condition is reflected in the increase in student participation and learning outcomes. The analysis of the research data indicates that the findings are consistent with previous studies, which also reported an improvement in student learning outcomes during the second cycle after the implementation of innovative learning methods (Mahardika, 2023) . This shows that implementing technology-based learning media may positively influence material understanding. However, in contrast to studies that emphasize the observation of student engagement during the learning process (Hutasoit & Gultom, 2023), this study focuses more on the effect of Google Sites-based E-learning media on learning outcomes. The findings of this research verify that the use of Google Sites-based e-learning is effective in enhancing student achievement in vocational education, while also encouraging independent learning through the integration of digital technology.

4. CONCLUSION

The results of data analysis and findings from research on the application of Google Sites-based e-learning in learning building utility construction drawing elements for grade XI DPIB students of Vocational School 1 Percut Sei Tuan in the 2024/2025 academic year show that the use of this instructional media provides a concrete positive influence on student achievement. Google Sites learning media not only assists students in retrieving learning resources, but also increases their participation and understanding of the material presented.

The application of this e-learning has succeeded in increasing the average value and percentage of classical completion, which indicates the effective achievement of learning objectives. Therefore, Google Sites media is highly recommended as an effective learning tool to support the teaching and learning process, especially in building utility construction materials.

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REFERENCES

A. Tegar Babur Firdaus, Moh. Ainur Rizal, & Thoifur Rahman. (2025). Pemanfaatan Teknologi dalam Pendidikan : Meningkatkan Interaktivitas Pembelajaran. *Pragmatik : Jurnal Rumpun Ilmu Bahasa Dan Pendidikan* , *3*(1), 256–265.

Dewi, A. P., Efendi, R., & Sasmita, D. (2021). the Effectiveness of Integrating Feedback Formative Assessment in Enhancing Students ' Cognitive Ability on Work and Energy. *Jurnal Pendidikan Fisika*, *10*(1), 1–5.

Effendi, D., & Wahidy, D. A. (2025). Pemanfaatan Teknologi Dalam Proses Pembelajaran Menuju Pembelajaran Abad 21. *Prosiding Seminar Nasional Pendidikan Program Pascasarjana Universitas Pgri Palembang*, 125–129.

Febrianty, Lie, D., Almubaroq, H. Z., Bagenda, C., Ichdan, dany A., Widowati, D., Wakhyuni, E., Romy, E., Abdurohim, Syamil, A., Sapinah, Pujiastuti, E. E., Napitupulu, R. M., Soetandio, L. L., Mahardhika, B. W., & Wardhana, A. (2023). Manajemen Bisnis: Konsep Dan Strateginya. In *CV.Media Sains Indonesia* (Issue June).

Festiawan, R. (2020). Belajar dan pendekatan pembelajaran. *Universitas Jenderal Soedirman*, 1–17.

Harefa, D. (2020). Peningkatan Hasil Belajar Siswa Dengan Pembelajaran Kooperatif Make A Match Pada Aplikasi Jarak Dan Perpindahan. *Geography: Jurnal Kajian, Penelitian dan Pengembangan Pendidikan*, *8*(1), 01-18.

Hutasoit, L. I. M., & Gultom, S. (2023). Pengembangan Bahan Ajar Berbasis Media Interaktif menggunakan Aplikasi Macromedia Flash untuk Meningkatkan Kemampuan Komunikasi Matematis di SMP Gema Buwana. *Jurnal Pendidikan Tambusai*, *7*(1), 543.

Kurniawan, M. R., & Sudarso. (2020). Hubungan antara Hasil Belajar Ranah Pengetahuan dan Keterampilan pada Pembelajaran PJOK Materi Senam Lantai Di SDN 25 Gresik. *Jurnal Pendidikan Olahraga Dan Kesehatan*, *8*(3), 143–147.

Machali, I. (2022). Bagaimana Melakukan Penelitian Tindakan Kelas Bagi Guru? *Indonesian Journal of Action Research*, *1*(2), 315–327.

Nurwulan, Y., Suryadi, D., & Supriatna, N. (2022). Pengembangan Desain Problem Based Learning Berbantuan Jobsheet dalam Pembelajaran Dasar-Dasar Konstruksi Bangunan Kompetensi Keahlian Konstruksi Gedung, Sanitasi dan Pemeliharaan di SMK. *Jurnal Pendidikan Teknik Bangunan*, *2*(1), 13–22.

O'Neill, A. (2024). Was humpty dumpty right?: Towards a functional definition of e-learning. *Education and Information Technologies*, *29*(2), 2093–2115.

Paisal, Satyahadewi, N., & Perdana, H. (2021). Pengembangan Aplikasi Statistika Berbasis Web Interaktif untuk Analisis Uji T. *Buletin Ilmiah Math. Stat. Dan Terapannya (Bimaster)*, *10*(3), 331–340.

Pendidikan, J., Bangunan, T., Fauzie, M., & Wibowo, D. E. (2024). Pengembangan Ebook Dalam Mata Kuliah Manajemen Kontruksi di Universitas Negeri Yogyakarta. *Jurnal Pendidikan Teknik Bangunan 2024*, *4*(2), 135–146.

Rabgay, T., & Kidman, G. (2023). Multiple iterations and messiness in the implementation of action research by Bhutanese secondary science teachers. *Discover Education*, *2*(1).

Rahayu, S., Afnan, M., & Kudwadi, B. (2021). Pengaruh Penggunaan Platform Microsoft Teams Terhadap Hasil Belajar Siswa di SMK. *Jurnal Pendidikan Teknik Bangunan*, *1*(2), 61–68.

Ramadhan, D. R., & Iriani, T. (2022). Pengaruh dari Model Pembelajaran Flipped Classroom Terhadap Hasil Belajar Siswa pada Mata Pelajaran Aplikasi Perangkat Lunak dan Perancangan Interior Gedung. *Jurnal Pendidikan Teknik Bangunan*, *2*(2), 115–122.

Ramadhan, M. A., Anisah, A., Amin, B., & Wahyuni, E. S. (2022). Pembelajaran Tutor Sebaya Siswa SMK Pada Mata Pelajaran Mekanika Teknik di Masa Pandemi COVID-19. *Jurnal Pendidikan Teknik Bangunan*, *2*(1), 1–12.

Savitri, W. A. (2025). *Improving Learning Engagement and Performance through Google Sites-Based Project Learning in Vocational Network Education*. *5*(1), 126–140.

Sugiyono. (2017). *Metode Penelitian Kuantitatif, Kualitatif*. CV.Alfabeta.

Widiastari, N. G. A. P., & Puspita, R. D. (2024). Penggunaan Media Pembelajaran Digital Dalam Mengembangkan Motivasi Belajar Siswa Kelas Iv Sd Inpres 2 Nambaru. *Elementary: Jurnal Inovasi Pendidikan Dasar*, *4*(4), 215–222.