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THE EFFECTIVENESS OF PBL MODEL TO IMPROVE STUDENTS' LEARNING OUTCOMES AT SMA NEGERI 2 SALATIGA

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Abstract

The Problem-Based Learning (PBL) model is recognized as an effective instructional approach that enhances both the learning process and student outcomes. It actively engages students in identifying, analyzing, and solving real-world problems, thereby fostering critical thinking, problem-solving, and collaboration skills. In school settings, PBL significantly improves conceptual understanding, knowledge retention, and the achievement of learning competencies. Previous studies have shown that PBL has a positive impact on cognitive, affective, and psychomotor domains, positioning it as a relevant strategy for addressing the educational challenges of the 21st century. This study employed an experimental method using a *Nonequivalent Control Group Design*, involving Grade X students at SMA Negeri 2 Salatiga. Class X-A served as the control group, while class X-B was designated as the experimental group. Data collection was carried out through pre-tests and post-tests, followed by statistical analyses including tests for normality, homogeneity, and mean differences. The results demonstrated that the use of different instructional media with the same teaching model led to higher post-test scores in the experimental group (72.44) compared to the control group (69.90). The t-test result of 2.072 exceeded the t-table value of 1.995, with a significance level of $0.004 < 0.05$. These findings indicate that the PBL model supported by Google Sites effectively enhances learning outcomes. In conclusion, the integration of PBL and Google Sites improves student performance, particularly in topics related to payment systems and financial instruments. The scientific contribution of this research lies in its innovative integration of problem-based learning with the digital platform Google Sites, which has been scarcely explored in similar studies. This study provides empirical evidence that simple yet interactive digital tools can strengthen the effectiveness of PBL in the context of economics education, especially when dealing with abstract and theoretical subjects such as payment systems. Moreover, the findings present new opportunities for educators and curriculum developers to explore accessible and practical technology-enhanced learning strategies that do not require complex infrastructure. Thus, this study not only enriches the literature on the effectiveness of PBL but also offers practical and applicable solutions for improving educational quality in the digital era.

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INTRODUCTION

The transformation of education in the 21st century demands a paradigm shift in learning that emphasizes the strengthening of critical thinking skills, problem-solving abilities, collaboration, and digital literacy. The Framework for 21st Century Learning highlights the importance of mastering higher-order cognitive skills and integrating technology within the learning process. In this context, there is a need for holistic learning innovations that encompass cognitive, affective, and psychomotor dimensions through a student-centered learning approach. The implementation of such approaches and innovations has been shown to positively contribute to improving students' learning outcomes across cognitive, affective, and psychomotor domains. According to Meke and Wondo (2020:590), the role of teachers in developing learning models significantly influences students' active engagement, which in turn impacts their academic achievement. This aligns with the findings of Mahsup and Anwar (2020:1), who state that the effectiveness of learning is greatly affected by the appropriateness of the models or methods used in relation to students' cognitive developmental stages and their learning environment contexts. Therefore, the selection of an appropriate learning model serves not only as a procedural guide for educators but also as a foundation for designing pedagogical interventions that can optimally facilitate students' understanding of instructional material.

The results of the 2022 Programme for International Student Assessment (PISA) indicate that Indonesian students' literacy, numeracy, and problem-solving skills remain below the global average, ranking 72nd out of 81 surveyed countries. These findings highlight the urgent need to strengthen learning strategies that promote the development of higher-order thinking skills, which are a primary focus in the implementation of the Merdeka Curriculum. The assessment of education quality in Indonesia is further supported by the Education Report Card instrument, an evaluative report based on the National Education Standards designed to provide a comprehensive overview of educational unit performance. The main objective of the Education Report Card is to serve as a measurement tool oriented toward improving quality and equity of learning outcomes, as well as a basis for policy formulation for educational units and local governments in their efforts to continuously enhance education quality. This instrument comprises five main assessment dimensions: (A) the quality and relevance of student learning outcomes, (B) equitable access to quality education, (C) the competencies and performance of teachers and education personnel, (D) the quality and relevance of the learning process, and (E) participatory, transparent, and accountable school management. The following data present an overview of the Education Report Card for all public senior high schools (SMA Negeri) in the Salatiga City area.

Table 1. Education Report of Public Senior High Schools in Salatiga City
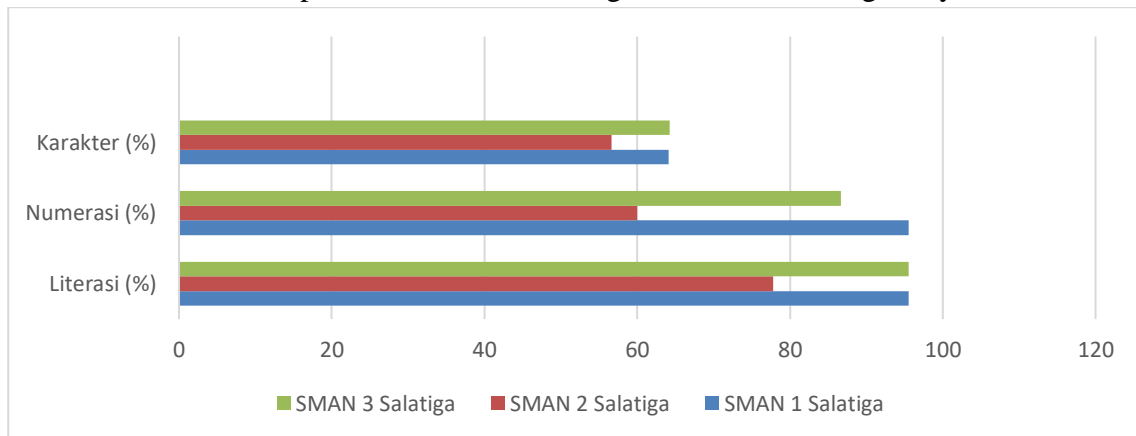
Source: Data from SMAN 1 Salatiga, SMAN 2 Salatiga, and SMAN 3 Salatiga.

Based on the available Education Report Card data, it is known that SMA Negeri 2 Salatiga ranks lowest among public senior high schools in Salatiga City. This achievement reflects that the quality and relevance of student learning outcomes are still suboptimal. Therefore, pedagogical interventions aimed at improving the quality of student learning outcomes are necessary.

Observations conducted at SMA Negeri 2 Salatiga revealed that learning achievement in the Economics subject for phase E remains relatively low, particularly in the topics of payment systems and payment instruments. Interviews with the subject teachers indicated that students' active participation during the learning process is still minimal. Students appeared less enthusiastic, exhibited signs of boredom, and were often engaged in activities that do not support learning, such as joking with peers or playing games during class.

This phenomenon can be explained by various factors influencing student learning motivation, both internal and external (Rafiola et al., 2020:74). Internal factors include physical condition, mental health, intelligence, intrinsic motivation, and active student engagement in the learning process. Conversely, external factors involve influences from family environment, peers, community, teachers, media, as well as the availability of learning facilities and infrastructure (Jufrida et al., 2019:631). By comprehensively understanding these dynamics, educators and school stakeholders can design more effective and contextualized intervention strategies to improve the quality of learning.

Based on the data obtained and field observations, several factors contribute to the low learning achievement of students. In this context, the role of teachers is crucial in creating a conducive and engaging learning environment. One topic with potential for improvement through innovative learning approaches is the payment systems and payment instruments. This material is highly relevant for implementation via the Problem-Based Learning (PBL) model, as this approach encourages students to develop analytical skills concerning policies implemented by Bank Indonesia in addressing various issues related to the payment system. Examples include policies on digital currency, pay-later services, and the phenomenon of online lending.

In the digital era characterized by advancements in information technology, the diversity of payment systems and methods especially non-cash payments has become an integral part of societal transaction activities. Therefore, students need to acquire a deep understanding of the importance of selecting non-cash payment methods that are not only efficient but also secure and registered as well as supervised by official institutions such as the Financial Services Authority (OJK). Thus, problem-based learning not only enhances the relevance of the material to real-life contexts but also strengthens students' digital financial literacy as preparation for future challenges.

The implementation of the Problem-Based Learning (PBL) model in instruction is grounded in its characteristic that allows students to actively engage in identifying, managing, and solving problems. Through this approach, students' cognitive abilities can be optimally developed, particularly in relating learning concepts to relevant real-world situations. Rombe et al. (2021:71) state that problem-based learning presents authentic and meaningful situations, thereby enhancing students' motivation to explore and investigate the issues raised, which ultimately contributes positively to learning outcomes.

In addition to innovations in learning approaches, the integration of instructional media is also a crucial factor in supporting the effectiveness of material delivery. In this context, digital media such as Google Sites is employed as a web-based learning tool presenting various content, including learning objectives, concept maps on the systems and payment instruments topic, instructional videos, written materials, and prompting questions for initial discussions. This media is designed for online access by students, allowing flexibility in learning and supporting more personalized engagement. The utilization of Google Sites in this study is motivated by students' low learning motivation and the limited reading references available during the learning process. This approach also aligns with the principles of the Merdeka Curriculum, which emphasizes the importance of differentiated learning based on individual students' characteristics and learning styles. By providing access to various learning material formats, Google Sites is considered capable of accommodating diverse learning styles and enhancing the quality of learning to be more dynamic and less monotonous (Rahmi & Samsudi, 2020:356).

The selection of the learning model and media in this study is grounded in various previous empirical findings that demonstrate the effectiveness of integrating instructional approaches with media use to enhance student learning outcomes. Wulandari et al. (2023:10) revealed that the application of the Problem-Based Learning model combined with Google Sites as a learning media on taxation material significantly improved student learning outcomes in the experimental group compared to the control group. Similar findings were reported by Arumdani et al. (2018), who found a positive and significant effect of using Google Sites as a learning media in enhancing student achievement in economics subjects. Furthermore, Hakim and Totalia (2016) stated that the implementation of the Problem-Based Learning model contributed substantially to improving learning outcomes in economics at SMA Negeri 5 Surakarta. In line with this, the study by Syakur and Sabat (2020:53) demonstrated that the integration of innovative e-learning technology in PBL-based instruction significantly increased students' academic performance. These

findings strengthen the theoretical and empirical foundation for integrating the PBL model and digital media such as Google Sites to support the achievement of more optimal learning outcomes.

In recent years, the problem-based learning (PBL) approach has proven effective in enhancing student engagement and critical thinking skills, particularly in contextual, problem-oriented learning environments. The application of PBL in economics education offers opportunities for learners to explore and solve real-world issues relevant to their daily lives. Nevertheless, the integration of PBL with interactive digital media—such as Google Sites—remains largely underexplored, especially in the context of teaching the economic phase (Phase E), which encompasses concepts such as economic growth, distribution, and economic cycles. Yet, Google Sites holds the potential to strengthen the collaborative aspects and data visualization processes essential for project-based problem solving.

However, not all studies report consistent results regarding the effectiveness of integrating the Problem-Based Learning (PBL) model and learning media in improving student learning outcomes. Gursul, as cited in Gündüz et al. (2016:50), reported that the implementation of the PBL model in a face-to-face learning context resulted in relatively lower achievement compared to its application in an online learning environment. Similarly, Khoirunnisa (2018:74) found that the use of e-learning technology in instruction did not have a significant impact on student learning outcomes. These results indicate variability and inconsistency in the effectiveness of the PBL model and digital learning media, which may be influenced by various contextual factors such as infrastructure readiness, student characteristics, as well as the design and implementation of the learning process. Therefore, further research is needed to identify the conditions and approaches that best support the optimal application of learning models and media.

Furthermore, recent literature reviews indicate that very few studies have explicitly combined the PBL model with web-based digital platforms such as Google Sites in the context of economics-related topics. Previous research has primarily focused either on the conventional implementation of PBL or on the use of digital media in isolation, without strategically integrating the two within the learning process of the economic phase (Phase E). This highlights a significant research gap that needs to be addressed, considering that the complexity of economics learning requires both interactive and technology-driven pedagogical approaches. Therefore, this study aims to explore the effectiveness of integrating PBL with Google Sites in enhancing students' understanding of economic phase concepts, as an effort to fill the existing gap in the literature.

This study aims to examine the effectiveness of implementing the Problem-Based Learning (PBL) model supported by Google Sites as a learning media in teaching the payment systems and payment instruments material for phase E to improve student learning outcomes. Initial observations indicate that the integration of innovative learning models and digital technology utilization in the learning process has been limited. The advantage of applying the PBL model lies in the active role of students in constructing knowledge through problem-solving, which contributes to strengthening cognitive

abilities. When combined with Google Sites, the learning process becomes more varied and engaging, as students can access materials in various formats, such as text, videos, and educational games, tailored to individual learning styles.

The method employed in this study is a quasi-experimental design involving two groups. The experimental group receives an intervention applying the PBL model combined with Google Sites, while the control group is taught using the same PBL model without the support of digital media. Based on the observed gap between practice and prior research findings, this study specifically aims to evaluate the extent to which the integration of the PBL model and Google Sites learning media can enhance student learning outcomes in Economics.

METHODS

This study employed an experimental method using a randomized subject design. The population consisted of all tenth-grade students at SMA Negeri 2 Salatiga, with random sampling as the sampling technique. In implementation, class X A was designated as the control group, class X B as the experimental group, and class X I was used for instrument trial. The research procedure was carried out in three main stages: (1) the preparation stage, which included the development of research instruments and conducting instrument trials; (2) the experimental implementation stage; and (3) the final stage, encompassing data analysis and reporting of research findings. Data collection techniques involved administering tests in the form of pre-tests and post-tests, supplemented by documentation as complementary data. The test instruments used in this study underwent a validation process, including validity testing, reliability testing, item difficulty analysis, and discrimination index analysis. The results of these instrument tests are presented in Table 1 as the basis to ensure that the measurement tools employed meet the criteria of reliability and validity.

The implementation of the Problem-Based Learning (PBL) model accompanied by Google Sites media on the topic of payment systems and payment instruments in the experimental class began by building students' conceptual understanding of the subject matter. This knowledge construction process was carried out independently by students through group discussions designed to expose them to contextual problems relevant to the digital era and current technological advancements, in which transaction systems have undergone significant transformation. In this context, students were also confronted with social realities, such as cultural habits and societal practices that still face barriers in adopting digital-based transaction systems.

As an initial stimulus, students were presented with an educational video containing information about Bank Indonesia's policies, including the introduction of QR Code-based payment systems, fast payment mechanisms, and the shift toward a more secure, efficient, and seamless national payment infrastructure. The material also included the strategic role of the central bank in regulating the national payment system. Through interactive discussions, students were encouraged to share opinions and collaboratively develop

understanding. As a result, they were able to grasp the concepts of payment systems and instruments, explain the role of the central bank in the payment system, and identify various forms of payment tools familiar to or used by them in daily life.

In contrast, the control class implemented the PBL model through a lecture-based approach that was teacher-centered and devoid of engaging learning media, thus allowing for a clear comparison between the experimental and control groups regarding the impact of the intervention. The following section presents the results of the test instrument analysis, including validity testing, reliability, item difficulty level, and item discrimination power.

Table 2. Instrument Test Results

Test	Result	Description
Validity Test	Sig < 0,05	Valid
Reability Test	0,861 > 0,70.	Reliabel
Item Difficulty level	24%	Easy
	48%,	Moderate
	28%	Difficult
Item Discrimination Power	1 item question	Very Good
	15 item questions	Good
	9 item questions	Sufficient

Source: processed data (2025)

Based on the results of the instrument testing conducted, all test items used in this study were deemed valid and reliable. Furthermore, the item characteristics, evaluated in terms of difficulty level and discrimination index, also met the quality criteria as outlined by Arikunto (2012:237), who recommends a proportion of test items consisting of 25% easy, 50% moderate, and 25% difficult questions as an indicator of a well-balanced test composition.

Data analysis in this study was carried out in two stages: prerequisite testing and hypothesis testing. Prerequisite tests included normality testing, homogeneity testing, and testing for equivalence of initial mean scores (pre-test) between the experimental and control groups to ensure baseline equality. After meeting these prerequisites, hypothesis testing was conducted using an independent samples t-test to determine significant differences between the two groups. Additionally, an analysis of intervention effectiveness was performed by calculating the Normalized Gain (N-Gain) to quantitatively and objectively measure improvements in learning outcomes as a result of the treatment applied to the experimental group.

RESULT AND DISCUSSION

This study aims to investigate the extent to which the implementation of the Problem-Based Learning (PBL) model supported by Google Sites contributes to the improvement of student learning outcomes on the topic of payment systems and payment

instruments. The researcher acknowledges that variations in instructional treatment during the learning process may result in differing impacts on student achievement. The findings indicate that the experimental and control groups had equivalent initial abilities, consistent with the fundamental principle of experimental research design, which requires both groups to possess homogeneous baseline characteristics, as verified by pre-test data. The intervention utilizing the PBL model combined with Google Sites is believed to enhance learning outcomes by fostering active student engagement through collaborative discussion and problem-solving processes. The differences in pre-test scores between the groups are detailed in Table 3, providing evidence of the initial equivalence in ability between the experimental and control groups.

Table 3. Pre T-test

Class	N	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Decision
Experiment	34	66	0,290	3.265	3.058	No Significant differences
Control	34	66	0,290	3.265	3.058	

Source: processed data (2025)

Based on the results presented in Table 3, it can be concluded that there is no significant difference in the initial abilities of students between the experimental and control classes. This indicates that the students' analytical skills related to payment systems in both classes were relatively homogeneous and comparable prior to the implementation of the instructional intervention. Subsequently, a post-test assessment was conducted to evaluate the students' learning outcomes following the application of the Problem-Based Learning model supported by Google Sites. The post-test data are detailed in Table 4, aiming to measure the effectiveness of the learning model in enhancing student learning outcomes.

Table 4. Post T-test

Class	N	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Decision
Experiment	34	66	0,004	3.265	3.046	Significant differences
Control	34	66	0,004	3.265	3.046	

Source: processed data (2025)

Based on the data presented in Table 4, a significant difference was observed in the learning outcomes of students in the experimental class that implemented the Problem-Based Learning model supported by Google Sites. The teaching of Economics, particularly on the topic of payment systems and payment instruments, became more effective due to the use of Google Sites, which allowed for clearer, more comprehensive, and detailed presentation of the material. This media also included instructional videos relevant to the

students' local context, such as issues related to cashless payments. Consequently, students were able to construct knowledge more independently through the integration of the PBL model and supportive video content, thereby fostering a deeper understanding of the subject matter.

This study aims to test the hypothesis that the use of Google Sites as a learning media is effective in improving the learning outcomes of tenth-grade students at SMA Negeri 2 Salatiga. To validate this hypothesis, an instructional intervention was conducted based on constructivist theory. Constructivism emphasizes that learners actively construct their own knowledge through interactions with their surrounding environment. The relationship between the application of constructivist theory and the improvement of learning outcomes is evident in the enhanced quality of students' understanding and critical thinking skills. By actively constructing knowledge independently, students are able to achieve deeper comprehension and apply the material across broader contexts.

The findings of this study align with the foundational learning theory, constructivism, which asserts that learners are granted the freedom to think critically and discover new concepts through active learning experiences. Within the constructivist framework, knowledge is regarded as the product of individual construction following environmental interactions, rather than merely the transfer of information from one individual to another (Candy, 1989; Ginting, 2018; Yusuf & Arfiansyah, 2021).

The implementation of the Problem-Based Learning (PBL) model supported by Google Sites proved effective in improving the learning outcomes of tenth-grade students at SMA Negeri 2 Salatiga. By presenting problems through guiding questions and case analyses in the Student Worksheet (Lembar Kerja Peserta Didik, LKPD), students were encouraged to independently construct their knowledge through critical thinking processes in problem-solving. Furthermore, the use of real-life cases relevant to the students' daily experiences increased their motivation to learn, making the learning process more meaningful and contextual. The intervention in the experimental class was carried out by applying the Problem-Based Learning model assisted by Google Sites in the subject of payment systems and payment instruments. The experimental class consisted of 34 students in class X-B and was conducted over two sessions. For comparison, the control class employed the same learning model but utilized news articles as the media.

The learning activities began by creating a conducive classroom atmosphere to support the smooth implementation of the learning process. Next, a cognitive diagnostic assessment in the form of a pre-test was conducted to gauge the students' initial abilities prior to the intervention. The test consisted of 25 multiple-choice questions administered via Google Form with a 20-minute time limit. The average pre-test score in the experimental class was recorded at 64.94. The learning process followed the syntax of the Problem-Based Learning model, which includes: (1) orientation of students to the problem, (2) organization of students, (3) guidance of students in group investigation, (4) development and presentation of work results, and (5) analysis and evaluation of the problem-solving process.

During the problem orientation stage, the experimental class was guided through the viewing of a learning video addressing issues related to payment systems and payment instruments in the community, such as mobile banking fraud and counterfeit money circulation. In this session, four students actively participated by asking questions and providing feedback related to the video content. Meanwhile, in the control class, students were given an online news article about the use of fake QRIS and phishing practices as the initial learning material. In the control class, two students actively engaged by asking questions concerning issues occurring in their surrounding environment.

In the second phase, namely the organization of students, learners were divided into heterogeneous study groups, each consisting of students with high, medium, and low academic abilities. The formation of these heterogeneous groups aimed to enable students with higher abilities to act as peer tutors, assisting their peers with medium and lower abilities, thereby fostering collaboration and enhancing understanding during the learning process.

In the third phase, which involved guiding group investigations, each group was assigned different case studies through the Google Sites learning media prepared by the teacher. These case studies consisted of online news articles addressing various current issues, such as Bank Indonesia's policies on the implementation of digital wallets for cashless payments, the operation of payment gateways without Bank Indonesia's authorization, customer data theft, Bank Indonesia's role in pay later and illegal online lending cases, and ATM card skimming crimes. Students actively worked collaboratively within their groups to find appropriate solutions for each case study by utilizing learning resources directed by the teacher.

Next, in the phase of developing and presenting the results, each group took turns presenting the solutions they had formulated, followed by feedback and discussion sessions from other groups. The final stage of the learning process involved administering a post-test to measure the students' level of understanding after the instructional intervention. The learning activities in both classes were conducted quite actively, with most students able to engage well in the learning process, although some required additional guidance and support.

This study aimed to identify the impact of the intervention provided to the experimental group by comparing the learning outcomes of students with those in the control group. The control class employed the same Problem-Based Learning model but without the support of the Google Sites media. Based on observations and student activity data, the level of student engagement in the experimental class was higher than that in the control class. This was reflected in the student activity sheets, where 87% of students in the experimental class demonstrated a very high level of engagement, compared to 78% in the control class, which was categorized as active.

To assess the improvement in students' learning outcomes before and after the intervention, an N-Gain analysis was conducted. This test aimed to evaluate the effectiveness of the Problem-Based Learning model supported by Google Sites based on

the gain scores achieved by the students. The results of the N-Gain test are presented in Table 5 below.

Table 5. N-Gain Score

Class	Mean Score		N-Gain	Criteria
	Pre Test	**Post Test**		
Experiment	64,94	72,44	0,981	High
Control	61,68	69,18	0,941	High

Based on the N-Gain test analysis, there was a more significant increase in the average score from the pre-test to the post-test in the experimental class compared to the control class. The experimental class achieved an N-Gain value of 0.981, categorized as high, while the control class obtained a value of 0.941, also categorized as high. Therefore, these N-Gain values indicate that the improvement in students' learning outcomes in the experimental class was greater than in the control class.

The results of the study indicate a significant improvement between the pre-test and post-test scores in the group taught using the Problem-Based Learning (PBL) model supported by Google Sites media. Prior to the intervention, the average pre-test scores of students fell into the low category, indicating limited initial understanding of the payment systems and instruments topic. Following the implementation of PBL integrated with Google Sites, there was a general increase in post-test scores, reflecting enhanced conceptual knowledge and critical thinking skills. This improvement can be attributed to the core characteristics of PBL, which encourage students to actively engage in identifying real-world problems, searching for relevant information, and formulating solutions based on group discussions. The use of Google Sites further reinforced this process by providing an interactive and flexible digital learning space, allowing students to access resources, document their thinking processes, and collaborate both asynchronously and synchronously. Moreover, this digital platform promoted autonomous learning and expanded students' opportunities for exploration beyond the confines of the physical classroom. Through structured, active, and collaborative engagement, students not only gained a deeper understanding of the material but also developed analytical and reflective abilities that directly contributed to the improved post-test outcomes.

This experimental study demonstrates that both the experimental and control classes experienced significant learning gains, with N-Gain values falling within the high category. The experimental class received instruction through the PBL model integrated with Google Sites, while the control class was taught using PBL without the support of digital media. Although both groups employed the same PBL approach, the high learning gains observed in both classes can be explained by the inherent effectiveness of the core PBL principles: encouraging students to actively engage in problem-solving, collaborate in groups, and construct knowledge independently within contextual settings. Thus, even in the absence of Google Sites, the control class benefited from the student-centered nature of PBL. Generally, PBL effectively enhances conceptual understanding, critical thinking

skills, and intrinsic motivation, all of which have a direct impact on academic achievement. However, the main distinction lies in the more interactive and digitally documented learning experience provided in the experimental class, which enabled students to access content more flexibly, visualize their thought processes, and track their learning progress through Google Sites. Therefore, although both groups achieved high learning outcomes, the incorporation of digital media in the experimental class added a valuable dimension to the learning process, supporting more sustainable and collaborative learning practices.

In the context of Problem-Based Learning (PBL), Google Sites functions not merely as a content delivery tool but also as a platform that facilitates differentiation, personalization, and more effective feedback provision. Through its flexible features, teachers can design pages tailored to students' diverse learning needs, such as providing enrichment materials for advanced learners or structured guidance for those requiring more intensive support. Furthermore, Google Sites supports personalized learning experiences, as students can access materials at their own pace and according to their preferred learning styles, while also documenting their thought processes, group discussions, and reflections independently in digital format. On the other hand, teachers can deliver direct feedback through written comments on linked documents, insert notes on students' project pages, or embed additional guidance without the need to wait for in-person sessions. These interactive features make Google Sites not only a gateway to wider access to learning materials but also a medium that enriches pedagogical interactions and more effectively supports student-centered learning.

These findings are consistent with previous studies. Banyal (2021) stated that the implementation of the Problem-Based Learning model significantly enhances students' learning outcomes. Furthermore, Lonergan (2022) and Grasas et al. (2016) also reported that the use of the Problem-Based Learning model has a positive impact on improving student achievement. Additionally, Firmansyah et al. (2023:11) concluded that web-based learning media, particularly Google Sites, are suitable for use in economics education. Wulandari et al. (2023:10) found that integrating problem-based learning models with Google Sites media on taxation material improved the learning outcomes of the experimental group compared to the control group. This is further supported by Arumdani et al. (2018), who demonstrated a positive and significant effect of using Google Sites as a learning medium on student achievement in economics subjects

CONCLUSION

This study aims to examine the effect of implementing the Problem-Based Learning (PBL) model supported by Google Sites media on students' learning outcomes in the topics of payment systems and payment instruments. Based on the research findings, the following conclusions can be drawn: (1) the implementation of the PBL model significantly improves students' learning outcomes, as evidenced by the higher average post-test scores in the experimental class compared to the control class; (2) the integration of Google Sites as a learning medium effectively enhances the learning outcomes of Grade

10 students at SMA Negeri 2 Salatiga on the specified topics, as demonstrated by the increase in students' average scores according to the N-Gain analysis; (3) Implications for teachers: this approach requires a shift in the teacher's role toward that of a learning facilitator not merely delivering content, but also designing relevant and contextual problem-based learning experiences and leveraging digital technology to enhance student engagement and autonomy. Google Sites provides a versatile platform for teachers to curate integrated learning resources, monitor student progress, and provide flexible and well-documented feedback; (4) Implications for curriculum developers: the successful integration of PBL with a digital platform highlights the importance of designing curricula that are adaptive, collaborative, and technology-oriented to meet the demands of 21st-century learning. Curriculum frameworks must support interdisciplinary and student-centered instructional approaches; and (5) Implications for policymakers: the positive outcomes of this model indicate the need for supportive policies that encourage the adoption of simple yet effective technologies such as Google Sites in schools. This includes providing professional development programs for teachers, investing in digital infrastructure, and developing curriculum policies that foster instructional innovation.
Overall, this approach underscores the importance of pedagogical transformation toward more active, problem-based, and digitally supported learning that is accessible and responsive to the evolving educational landscape.

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