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Enhancing economic learning: The dynamic impact of PBL using Google Sites and student motivation

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Abstract
An effective approach to boosting motivation and enhancing learning results is integrating the PBL model with digital tools like Google Sites. This strategy encourages students to develop critical thinking and problem-solving abilities. Incorporating technology can also foster a more engaging and context-based learning experience. This study aims to examine: 1) the effect of the PBL model enhanced by Google Sites affects learning motivation, 2) the effect of the PBL model enhanced by Google Sites on learning outcomes, and 3) the effect of the PBL model enhanced by Google Sites and learning motivation to learning outcomes. This research employed a quasi-experimental framework, particularly the Post-test Only Control Group. The study involved 60 students from class XI at State Senior High School 8 Malang, split into two groups: an experimental group (30 students) that utilized the PBL model with Google Sites, and a control group (30 students) that adhered to conventional teaching methods. Data analysis involved evaluations of normality, homogeneity, and ANOVA. The results show: 1) the PBL model enhanced by Google Sites significantly improves learning motivation, 2) the PBL model enhanced by Google Sites improves student learning outcomes, and 3) the PBL model enhanced by Google Sites and student motivation improves learning outcomes. Based on Cohen's D test, learning outcomes learning outcomes have a higher effect than learning

motivation when using PBL using Google Sites. Future research could investigate additional variables, broaden the scope of the study, and incorporate mixed methods for more comprehensive insights.

Keywords: *PBL using Google Sites; learning motivation; learning outcomes; economic learning.*

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INTRODUCTION

Learning outcomes are some of the critical indicators used to assess the process of learning. Learning outcomes provide evidence of how learning objectives have been met through cognitive, affective, and psychomotor domains (Albus et al., 2021). However, learning outcomes are not restricted to academic performance but also encompass the development of skills relevant to the workplace and society in general (Mertens et al., 2022; Sutherland et al., 2024). In an age characterized by globalization and rapid technological progress, individuals must cultivate critical, creative, and problem-solving skills (Andersen & Rustad, 2022). As a result, prioritizing learning outcomes has become crucial for educational institutions, equipping learners to compete globally and positively impact society.

Learning outcomes serve as valuable assessment tools for educators and policymakers in crafting more effective and pertinent educational strategies (Çelik et al., 2021; San-Martín et al., 2020). Furthermore, educational institutions can identify the strengths and weaknesses in their teaching methods, curricula, and learning environments. This identification lays the groundwork for ongoing improvement within the education system. Good learning outcomes affect academic achievement, self-confidence, motivation, and a lifelong love of learning (Hamilton et al., 2021). This implies that the best learning outcome could be fundamental in bringing forth the full development of every learner. Low student learning achievement in Indonesia's education system, evidenced by 70% of students scoring below basic proficiency and 40% not meeting national exam standards, is a multidimensional problem influenced by inadequate infrastructure, socio-economic disparities, and low student engagement, requiring a holistic approach to improve student learning outcomes (Kadir et al., 2022; Maisaroh & Untari, 2024; OECD, 2022).

Conventional teaching approaches, like lectures and memorization, have been less effective in fostering students' critical thinking skills and the practical use of knowledge (Avci et al., 2021; Carter et al., 2020; Mahajan & Kalpana, 2023). This is supported by C. Zhang et al. (2021), research shows that conventional learning models, such as lectures, reduce students' learning scores and motivation because they are teacher-centered, making students passive and bored. In addition, Jackson (2015) and Nadeem et al. (2023) add that the lack of relevance of the material, variety of media, and low self-confidence of students also hinder understanding and motivation in learning economics. Subsequently, students tend simply to passively learn

without deeply understanding the course material. One class that is considered to be complex and poorly perceived is economics. The student must grasp the important difference between economic growth, which is characterized by a short-term increase in the production of goods and services, and economic development, which involves progress related to equity, quality of life, and long-term enhancement. Students are influenced internally by motivational levels, which play a huge role in their learning outcomes.

Highly motivated students will go the extra length to listen and understand what is being taught in class, as well as prepare for tests and projects (Enriquez-Traba et al., 2025). Motivation may emanate from students themselves or external sources such as support from parents, friends, or recognition by schools. According to Elshareif & Mohamed (2021) earners with intrinsic motivation engage in learning to achieve mastery of the material or to gain a more profound comprehension, while extrinsically motivated students are primarily influenced by external rewards, like grades or recognition.

Despite the important role of motivation in improving learning outcomes, many students struggle to engage deeply in their lessons due to uninteresting teaching methods, a lack of relevance to the real world, and a lack of interactive elements. A high reliance on textbooks and limited use of media further reduce students' enthusiasm for learning (Ichsan et al., 2020; Liando et al., 2022). Without opportunities for active participation and meaningful connections to their lives, students are less likely to develop intrinsic motivation or appreciate external rewards (Chaudhuri, 2020; Wentzel, 2020). As a result, their understanding of complex concepts, such as economic growth and development, remains shallow, limiting their ability to apply these ideas in real-life contexts. This gap highlights the urgent need for more innovative and engaging teaching strategies to bridge the gap between motivated learning and disengaged classrooms.

Through detailed observations and discussions with economics instructors at State Senior High School 8 Malang, the intricacy of this issue was discovered. The process of teaching and learning within the classroom still uses conventional methods in delivering the subject matter; the teachers depend heavily on textbooks and conventional printed materials as the main source of teaching. These conditions highly limit the delivery of knowledge, such as teaching material, discussion, and exercise. The problem is further worsened for both teachers and students by the limited utilization of media in the presentation of educational content. Furthermore, the limited chances for dialogue between educators and learners, largely due to the busy schedules in educational institutions, along with the inadequate involvement of students in their learning, impair the understanding of concepts like economic growth and development. Instead, it is a lack of more interactive approaches and real-life applications that leads to decreased learning outcomes. In that regard, decreased motivation to understand the material reduces students' mastery of concepts in economic growth and development, which are supposed to apply to everyday situations, both social and economic.

To improve effective learning, three criteria must be met: (1) it must be easily available; (2) it must facilitate independent learning for students; and (3) it must be individualized to meet the needs of independent learners (Lee & Reeves, 2007). A useful method to boost motivation and improve learning results is to combine the PBL model with technology, like Google Sites. This method will not only stimulate students' critical thinking and problem-solving skills but will also grant them convenient access to educational resources, opportunities for interaction with educators and classmates, and adaptability in managing project-based challenges. Technology enhances more active and contextual learning and may lead to increasing student motivation, which in turn may improve understanding and learning outcomes.

Thus, the primary benefits of PBL include the enhancement of critical thinking, creativity, collaboration, engagement in learning, increased motivation, and improved academic results for students (Sari et al., 2021; Siswanti & Indrajit, 2023). On the other hand, PBL also has some drawbacks, including that projects take more time, there are problems related to group work, and students have difficulties accessing sources relevant to their education. According to (Amir, 2016; Islamiati et al., 2024), could be eased with the help of Google Sites. With this platform, the teacher can organize learning resources in a structured way for student access at any time and place (Aulia et al., 2021). Johdi et al. (2024), Mukhoyyaroh et al. (2023), and Mustofa et al. (2024) add that the features of online document sharing and discussion forums make Google Sites facilitate collaboration by letting learners work in groups even though they are from different locations. The current study relates to the work of Pratiwi et al. (2024) and Wardani et al. (2024), the emphasis was on evaluating how effective the PBL model, utilizing Google Sites, is in improving students' critical thinking abilities.

Furthermore, similar studies by Nugraha et al. (2023) and Basori & Jufri (2024) also demonstrated that employing the PBL approach with the use of Google Sites improved interest and achievement in learning. (Meng et al., 2023) and Santos-Meneses et al. (2023) support this claim, indicating that combining the PBL approach with media in e-learning enhanced the quality of education. Besides, Martyaningrum et al. (2021) and Yustina et al. (2022) found that integrating PBL with educational media could significantly enhance critical thinking skills. Furthermore, PBL allowed the development of sophisticated problem-solving skills among learners, considerably enhanced by the use of technological media (Dita et al., 2021; Restuti et al., 2021). Another investigation, conducted by Nofida & Arif (2020), showed that introducing e-learning to PBL methods motivates learners to become more involved in studying and hence raises their enthusiasm about learning, along with its outcome.

Moreover, Fitri et al. (2023) added that this PBL model, integrated with e-learning technology, might represent learning flexibly and interactively even when the educational circumstances were restricted. Walker et al. (2015) asserted that the essence of PBL is in the media of support for learning processes during students' exploration and interaction. It represents an innovative combination of Problem-Based Learning with e-learning tools, extending the contributions of Kurniati et al. (2021) and Trullàs et al. (2022); therefore, it

requires more effective studies. On the other hand, no research has analyzed so far the impact of the PBL model, using Google Sites, together with student motivation, on the learning outcomes of high school learners.

Therefore, further research is needed regarding how the integration of e-learning technologies can support the effective implementation of problem-based learning, especially in terms of enhancing student motivation and learning outcomes. Considering the conditions above, this research is conducted to study the following items: 1) the effect of the PBL model using Google Sites on students' motivation; 2) the effect of the PBL model using Google Sites on the learning outcome; and 3) the effect of the PBL model using Google Sites and motivation towards the learning outcome while studying economic growth and development at State Senior High School 8 Malang. Explanation related to the variables used and the hypothesis in this study.

Ho1: There is an effect of the PBL model assisted by Google Sites on learning motivation.
Ha1: There is no effect of the PBL model assisted by Google Sites on learning motivation.
Ho2: There is an effect of the PBL model assisted by Google Sites on learning outcomes.
Ha2: There is no effect of the PBL model assisted by Google Sites on learning outcomes.
Ho3: There is an effect of the PBL model assisted by Google Sites and learning motivation on learning outcomes.
Ha3: There is no effect of the PBL model assisted by Google Sites and learning motivation on learning outcomes.

METHOD

This study uses a quantitative research methodology that applies a quasi-experimental framework with a Post-test Only Control Group Design. The choice of the design was due to time efficiency and avoiding testing effects that may affect the results (Maciejewski, 2020). This study involved two class groups: one experimental group and one control group. The experimental group underwent therapy using the PBL model integrated with Google Sites, while the control group participated in teaching through traditional methods. The research design used is presented in Table 1.

Table 1. Post-test only control group design

Class	Treatment	Posttest
Experiment	X	Q1
Control	-	Q2

Source: Creswell & Creswell (2017)

Description:
Q1 : Post-test in Experiment class
Q2 : Post-test in Control class
X : Learning PBL Using Google Sites
- : Learning using a conventional model

Furthermore, the experimental class used the PBL model with Google Sites media through the syntax of Amin et al. (2020), as shown in Table 2. Then, the control class used the conventional model from Juniar et al. (2021), as shown in Table 3.

Table 2. Modified syntax of PBL using Google Sites

No.	Stages	Activity	Type of Learning
1	Problem Orientation	Students receive an explanation regarding the issue of economic growth and development.	Synchronous online/offline
2	Problem-Solving Planning	Students are organized into groups to talk about the specifics of the issues identified. Afterward, they strategize on the process for solving the problems.	Asynchronous & online meetings using Google sites (https://sites.google.com/view/edulearneconomic)
3	Investigation	Students perform an inquiry to find a solution to the issue.	In class, using Google Sites
4	Report Preparation and Presentation of Findings	Students create a report detailing the outcomes of their problem-solving efforts based on their research and present it through a presentation.	Synchronised online
5	Analysis and Evaluation	Students examine and assess the problem-solving process.	Asynchronous online
6	Actualization	Students explore the field or environment to implement the selected problem-solving approach.	Outdoor

Source: Amin et al. (2020)

Table 3. Syntax of the conventional model

No.	Stages	Activity	Type of Learning
1	Delivering goals and preparing students	Students listen carefully to the information conveyed by the teacher.	Asynchronous /offline
2	Demonstrate knowledge and skills	Students observe the demonstration of the skills delivered by the teacher.	
3	Guiding Training	Students follow the initial guidance from the teacher	
4	Check understanding and provide	Students carry out the tasks given by the teacher carefully and correctly.	
5	Provide opportunities for advanced training	Students carry out advanced training provided by the teacher and prepare for the application of special training.	

Source: (Juniar et al., 2021)

The research subjects in this study consisted of 60 students, who were selected through a purposive sampling technique from class XI IPS (Social Science Studies), SMA Negeri (State Senior High School) 8 Malang, in the odd semester of the 2023-2024 school year. The selection of this technique is based on the results of the midterm exam in economics. Two out of four

classes, namely XI-IPS 2 and XI-IPS 3 classes, with high average scores of 90.86 and 90.72, were used as research classes. In this study, a total of two groups were formed, namely the experimental group (XI IPS 2) and the control group (XI IPS 3), with a total of 30 students. Information about how the product influenced students' motivation to learn was obtained through a 12-item questionnaire which also looked into various indicators of learning motivation such as (1) the presence of aspirations and a desire for success; (2) the existence of motivations and needs relevant to education; (3) presence of hopes and dreams about the future; (4) availability of incentives within the learning process; (5) presence of enjoyable activities during the educational process; and (6) existence of a supportive educational environment (Uno, 2021). Concurrently, learning outcomes were assessed using 25 test questions focusing on the cognitive aspect.

Each item included in the questionnaire was evaluated for validity as part of the validity assessment of the research instrument. The validity assessment was conducted using construct experts and comparing the score of each item with the overall score of the corresponding subscale using the Product product-moment test. An item is considered valid if the calculation result of the T_{count} is higher than the T_{table}. In the validity assessment of the learning motivation questionnaire, all 12 statements evaluated were declared suitable for use without revision, with a score of 91.67 by the construct expert. Validity test using Product Moment, all items are valid because the T_{count} is higher than the T_{table}. Then, the learning motivation instrument was tested for reliability, which concerns the consistency and accuracy of measurement. Data will be reliable if the Cronbach's Alpha value is greater than 0.6. The assessment of learning motivation resulted in a Cronbach's Alpha value of 0.932, which indicates reliability. In addition, from a total of 30 questions for the validity test of the learning outcomes test questions, the test questions were declared feasible without revision, with a value of 89.30 from the construct expert. The validity results using product moment showed 5 invalid questions and 20 valid questions. Reliability results show that Cronbach's Alpha is greater than 0.6, with a value of 0.893, which proves that the instrument is reliable.

Inferential statistical methods were utilized to assess the impact of the PBL model using Google Sites on student motivation and learning outcomes. Data analysis was conducted using the SPSS 23.0 program, using a significance level in the analysis of 0.05. The tests for normality and homogeneity were conducted, along with the ANOVA test.

RESULTS AND DISCUSSION

Effect of PBL Model Using Google Sites on Learning Motivation

Learning motivation data was tested using the normality test with the Shapiro-Wilk method and the homogeneity test with Levene's Test method (Table 4).

The outcomes of the normality assessment are presented in Table 3. Based on the Shapiro-Wilk test, the significance values for both the control and experimental groups exceed 0.05, with Sig. > 0.05, indicating that the motivation data follow a normal distribution. Moreover, in

the homogeneity test by Levene's Statistic, the significance value was found to be above 0.05, Sig. > 0.05, which stated that the learning motivation data was homogeneous. Therefore, the data meet the criteria for a parametric analysis using the ANOVA test, as in Table 5.

Table 4. Normality and homogeneity test results of learning motivation

Class	Normality Test Result (Shapiro-Wilk)	Homogeneity Test Result (Levene's Test)
Experiment	0.112	0.052
Control	0.452	

Source: Data Processed

Table 5. Anova test results of the effect of PBL using Google Sites on learning motivation

Variable	Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)	Cohen's d
		Lower	Upper				
PBL Using Google Sites - Learning Motivation	16.72267	22.27587	11.16947	6.028	58	0.000	1.556

Source: Data Processed

The results shown in Table 5 reveal a significance value of 0.000, which falls below the threshold of 0.050, concerning the learning motivation variable. This suggests that the implementation of the PBL using Google Sites significantly enhances student learning motivation. Then Cohen's D value to determine the effect of PBL using Google Sites on learning motivation shows a value of 1.556, which is included in the high category.

The analysis shows a significant relationship between the implementation of the PBL model and the increase in motivation to learn, especially when enhanced by interactive media like Google Sites. Creative, dynamic multimedia not only offers an engaging learning experience but also encourages students to actively participate in the educational process. It nurtures the motivation of students toward their studies, as Afifa & Astuti (2024) and (Bazargan, 2023) have pointed out. The PBL using Google Sites proved effective in triggering learners' motivation toward learning by solving real-life problems, further developing a sense of responsibility toward education.

The PBL model allows learners to develop critical thinking skills and engage with peers in problem-solving activities. According to Lismaya (2019) the PBL teaching method promotes more active engagement among students because it fosters critical thinking and teamwork. Moreover, the relevancy of the subject matter to real-life situations is also an important factor in enhancing motivation among the students. The topics related to the experiences of daily life provide a better learning process and make the students more interested in their learning. (Ferrer et al., 2022; Huang et al., 2023). In the PBL model, using technology with Google Sites increases the motivation to learn significantly because the student can access it at any time and from anywhere (Theobald, 2021).

Interactive and interesting learning media design in the form of visualization, animation, and simulation has great relevance to increasing student learning motivation. According to Clark & Mayer (2023) in multimedia learning theory, the combination of text, images, and animation utilizes visual and verbal channels simultaneously, thus increasing student understanding. Bi (2021) in dual coding theory also states that information presented visually and verbally is easier to understand and remember. Features such as task menus that allow in-depth analysis of the growth of developing countries can increase learning motivation, as asserted by (Laurens Arredondo & Valdés Riquelme, 2021) in the ARCS Model of Motivation, which emphasizes the importance of relevance and practical application. According to Yin et al. (2021), effective multimedia design may strengthen students' comprehension of complex ideas and enhance information retention. In addition, the partnerships cultivated in PBL learning allow students to engage in discussions, exchange their thoughts, and collaboratively address challenges. Hosen et al. (2021) and Pan (2020) present that cognition is importantly influenced by social interaction, and further, this factor does have a positive effect on learning motivation. Using interactive media with the PBL framework supported on Google Sites level up not only the motivation but also the active, critical, and innovative development of learners, ready for real-life challenges.

The Effect of the PBL Model Using Google Sites on Learning Outcomes

In assessing the normality and homogeneity of the data, the learning outcome information was analyzed using the Shapiro-Wilk test and Levene's Test. The results are presented in Table 6.

Table 6. Normality and homogeneity test results of learning outcomes

Class	Normality Test Result (Shapiro-Wilk)	Homogeneity Test Result (Levene's Test)
Experiment	0.152	0.519
Control	0.223	

Source: Data Processed

Table 6 displays the results of the normality test, indicating that the significance values for both the control group and the experimental group are greater than 0.05 (Sig. > 0.05). This suggests that the data on learning outcomes exhibit a normal distribution. Additionally, the findings from the homogeneity test indicate a significance level that exceeds 0.05 (Sig. > 0.05), implying that the learning outcome data show homogeneity. Consequently, the data fulfill the requirements to perform a parametric test using the ANOVA Test, as illustrated in Table 7.

Table 7. Anova test results of the effect of the PBL model using Google Sites on learning outcomes

Variable	Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)	Cohen's D
		Lower	Upper				
PBL using Google Sites - Learning Outcomes	27.467	31.819	23.114	12.632	58	0.000	3.262

Source: Data Processed

The results in Table 7 show a significance value of 0.000 < 0.050 for the learning outcomes variable. This shows is significant effect on improving student learning outcomes after applying the PBL model using Google Sites.

The positive relationship between motivation and the use of interactive media has a significant impact on improving learner learning outcomes, including those in economic subjects, as stated by (Çelik et al., 2021; Sumarni & Kadarwati, 2020). Students are more active in exploring and understanding concepts taught when they feel interested and excited about the learning materials (Felder & Brent, 2024; Goldberg et al., 2021). The concepts will be better understood, the material better retained, and the use of knowledge in reality will be enhanced with this kind of exploration activity. Interactive media for presenting simulations, animated videos, and dynamic graphics make the comprehension of complex economic concepts simpler and more visual for learners. Zhang & Jiang (2024) explain that multimedia elements can enhance information processing, strengthen understanding, and extend learners' memory of the material studied.

Interactive media also increase learners' retention of material and analytical skills. Santos Garduño et al. (2021), research shows that with interaction-based learning methods, educational games, and digital case studies, the increase in retention can be up to 30% higher compared to traditional learning methods. In economic learning, a PBL-based approach combined with interactive media enables learners to analyze economic problems, formulate solutions, and apply theories in real situations. According to Kinanti & Suprayitno (2021), this approach can develop critical and creative thinking skills.

Other ways learners' intrinsic motivation is improved include engaging in interactive media. Rød & Calafato (2023) explain that intrinsic motivation is a very important part of successful learning because motivated learners generally become more enthusiastic, independent, and focused on achieving academic goals. In addition, with technology-based media such as E-Modules or online platforms, learning can be made flexible anytime and anywhere. This flexibility, according to Alamri et al. (2020), gives learners a chance to tailor the learning process to their individual needs, optimizing the experience.

Besides, another aspect that might account for improving learning outcomes is the economic learners' involvement in active participation. Through media interactivity, for instance, learners may perceive the implementation of economic theories into practice by a market simulation or a financial calculation, and a case study. It has thus brought a meaningful learning pace, which according to Schunk & DiBenedetto (2021), directly improves learning results. In other words, integrating interactive media into economics learning could not only enhance learners' motivation to learn but also create a relevant, engaging, and motivating learning environment

that assists learners in building deep understanding, critical thinking, and readiness for real-world economic challenges.

The Effect of Google Sites Using the PBL Model and Learning Motivation on Learning Outcomes

From Table 8, the calculated F value is 57.229, and the significance level is 0.000, which is less than 0.05, indicating that all independent variables collectively influence the dependent variable.

Table 8. Simultaneous F-test results in the effect of PBL using Google Sites and learning motivation on learning outcomes.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	15997.724	3	5332.575	57.229	.000
Within Groups	10808.833	116	93.180		
Total	26806.557	119			

Source: Data Processed

Furthermore, Cohen's d test was conducted to determine the magnitude of the influence of PBL using Google Sites on interest and learning outcomes. The results show that learning motivation and learning outcomes both have a value in the criteria for a very high effect that is above> 0.8. Even so, learning outcomes have a higher effect than learning motivation, with a value comparison of 3,262 and 1,556. The results can be seen in Table 9.

Table 9. Cohen's D-test result

Variable	Cohen's d
Learning Motivation	1.556
Learning Outcomes	3.262

Source: Data Processed

The results of the hypothesis testing in Table 8 show that the PBL using Google Sites has a positive effect on students' motivation and learning outcomes. PBL has been found to increase student engagement because it deals with real-life situations that require problem-solving skills. This approach helps students to better comprehend the theory and also develops some important practical workplace skills, such as working in a team and making decisions (Dita et al., 2021). Integration of technology, like for example, Google Sites, into PBL enables students to become autonomous learners and source multiple sources of information, therefore enhancing their cognitive ability to understand the learned material (Restuti et al., 2021; Safithri et al., 2021).

Ryan & Vansteenkiste (2023) explain that had positive relationship between motivation and academic achievement. Integration of problem-based learning, like Google Sites, into the lessons will enhance the motivation of students since it is interactive and addresses their needs in solving problems. This is further corroborated by challenges provided by the teachers

themselves in creating a warm learning environment; it also emphasized innovations in teaching methodology (Avcı & Yildiz Durak, 2023).

In implementing technology-assisted PBL, the teacher's role is foremost and central. The teacher not only has to be a teacher but also a facilitator who can motivate and guide students in facing learning challenges. According to Bachtiar (2020), the success of the Google sites-using PBL model depends on the ability of the teacher to design relevant and challenging learning experiences and to facilitate in-depth discussions. Though physical conditions at home and school may affect learning, high motivation on the part of students and skill on the part of the teacher in managing technology-based learning can surmount external obstacles to create an environment supportive of learning (Santi et al., 2020). The application of technology in learning minimizes dependency on external factors since students remain engaged in productive learning.

Additionally, this study supports Allan Paivio's Dual-Coding Theory, which was introduced in 1971. According to the notion, exposing kids to verbal, oral, and virtual visuals in media might help them grasp and comprehend the content better. Using media in educational activities will also help kids remember things better (Baharudin et al., 2021) According to Jean Piaget's constructivist theory, students can actively participate in the educational process by utilizing interactive technology, movies, and simulations. This aligns with constructivism's tenet that calls for students to actively participate in their education (Saleem et al., 2021).

Furthermore, based on Table 8, Google Sites using PBL has a greater influence on student learning outcomes than learning motivation because this method creates an interactive, collaborative, and structured learning environment. Fatra et al., 2024 and Ginusti (2023) explain that PBL requires students to be actively engaged in solving authentic problems, while Google Sites facilitates this process by providing a platform to organize information, collaborate, and present solutions digitally. This active engagement enhances students' conceptual understanding and critical thinking skills (Arsyad et al., 2024; Pertiwi et al., 2024). In addition, Google Sites supports collaboration between students, allowing them to give each other feedback and deepen their understanding through discussion. According to Mattessich & (Johnson, 2018), motivation to learn, while important, does not necessarily guarantee active engagement or effective collaboration, so learning outcomes may not be optimal without supportive learning methods.

Google Sites also facilitates the accessibility of learning materials and allows teachers to provide real-time feedback, which helps students identify errors and improve their understanding (Rao et al., 2021). In addition, the platform encourages students' creativity in designing solutions and presenting them visually, which increases engagement and understanding of the material (Cao et al., 2021). The use of relevant technology in PBL also makes learning more engaging and contextualized, preparing students with 21st-century skills such as digital literacy and critical thinking (Lacka et al., 2021; Wannapiroon & Pimdee, 2022). Learning motivation, although it can encourage students to learn, does not always provide these

elements in an integrated manner. Thus, Google Sites-based PBL provides a greater impact on learning outcomes as it incorporates active engagement, collaboration, accessibility, feedback, creativity, and the use of relevant technology.

Then, the limitation of this research is that student activity during learning is often uneven, creating diverse dynamics in the classroom. Some students show very high participation, such as actively answering questions, proposing ideas, or engaging in discussions with enthusiasm. However, some students tend to be passive, unresponsive, or even not involved at all in the learning process. This creates an anomaly or significant difference in the level of student activity. This condition can be influenced by various factors, such as differences in interest, learning style, level of understanding of the material, or even students' psychological conditions. If not addressed, this inequality can affect the learning climate in the classroom and hinder the optimal achievement of learning objectives. Therefore, educators need to find the right strategy so that all students can be actively and evenly involved in the learning process.

CONCLUSION

The result of this study showed: 1) PBL using Google Sites is positive and significantly influences students' learning motivation. It can be shown from the result of the partial t-test is 0.000, indicating less than 0.05; 2) PBL using Google Sites, also affects positively and significantly the learning outcomes of students, seen from the partial t-test results with a significance value of 0.000, falling below 0.05; and 3) Influence of PBL using Google Sites combined with learning motivation on student learning outcomes, represented by a 0.000 significance value, or less than 0.05. Based on Cohen's d test, learning outcomes have a higher influence than learning motivation when using PBL media using Google Sites with a value comparison of 3.262 and 1.556. Interactive media engagement, for instance, through Google Sites, has completely changed how actively students will work, think out problems, and understand concepts being simulated or created with dynamic graphics. The motivational effects of the problem-based methodology and technological tools also contributed substantially to enhancing students' learning processes.

This research implies that teachers can integrate Problem-Based Learning (PBL) with digital platforms such as Google Sites to enhance students' motivation and learning outcomes. Google Sites can be used as an interactive medium to present problems, learning resources, and facilitate collaboration among students. Additionally, schools and educational authorities can encourage the use of digital platforms in learning, including providing training for teachers to master technologies like Google Sites. Policies can support the provision of adequate technological infrastructure, such as internet access and digital devices in schools.

Although Google Sites is easy to use and suitable for creating simple websites, its limitations in terms of design and customization make it less visually appealing. This can be a significant drawback, especially if the research or project requires a professional, interactive, and attention-grabbing web presentation. Further research can help address the weaknesses of

Google Sites in terms of design and customization, thereby making it more competitive and appealing to users who require professional and interactive web appearances. In addition, for future research include consider the use of other variables to broaden the understanding of factors that influence learning outcomes. In addition, research can be extended to other subjects or with more diverse subjects, as well as using mixed methods to gain deeper insights. Long-term research can reveal the sustainable impact of the PBL model using Google sites.

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