The Effect of Teachers' Ability To Manage Deeplearning And Digital Utilization On Students' Learning Motivation at SMP Negeri 2 Airmadidi

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Abstract.
This study aims to examine the effect of teachers' ability to manage deep learning and the utilization of digital tools on students' learning motivation at SMP Negeri 2 Airmadidi. The study employed a quantitative approach with an associative research design. The population consisted of 606 students, with a sample of 92 students selected through purposive sampling. Data were collected using a Likert-scale questionnaire measuring deep learning, digital utilization, and learning motivation. Data analysis was conducted using descriptive statistics and multiple linear regression with the assistance of SPSS. The results indicate that teachers' ability to manage deep learning and digital utilization each have a significant effect on students' learning motivation, both partially and simultaneously. These findings suggest that learning approaches emphasizing deep conceptual understanding, along with effective use of digital technology, can enhance students' engagement, interest, and motivation. Therefore, it is essential to continuously develop teachers' competencies in implementing deep learning and utilizing interactive digital media.

Keywords: *Deep Learning, Digital Utilization, Students' Learning Motivation and Teachers' Competence.*

I. INTRODUCTION

Education in the 21st century is facing massive transformational challenges alongside the rapid development of science, technology, and social dynamics. Schools are no longer merely institutions for knowledge transfer but have become strategic spaces for character building and the development of 21st-century skills, including critical thinking, creativity, communication, collaboration, and digital literacy. This paradigm shift requires a change in learning approaches so that the learning process is no longer superficial and mechanical but is able to build meaningful and sustainable understanding for students. However, the reality of educational quality in Indonesia still requires serious attention; the 2022 PISA results placed Indonesia in the lower ranks, with literacy, mathematics, and science achievements still at a basic level. This condition reflects that learning practices in schools remain largely oriented toward memorization and score attainment, and have not optimally fostered students' analytical, evaluative, and reflective thinking skills.

In response to this condition, the *Merdeka Belajar* policy has been introduced to encourage student-centered learning transformation, enabling learners to develop independence and critical reasoning skills. One highly relevant approach is deep learning. Unlike surface learning, which focuses on memorization, deep learning encourages students to understand concepts comprehensively, connect knowledge with real-life experiences, and engage in reflective learning processes. According to Delialioglu (2021), this approach effectively promotes higher-order thinking through analytical and creative activities. To ensure optimal implementation, Mu'ti (2025) emphasizes three key principles: mindful, meaningful, and joyful learning. These efforts can be further strengthened through the integration of interactive digital technologies. Karim and Hartati (2021) argue that technology integration can enhance students' interest and accelerate understanding by presenting contextualized learning materials suited to today's digital generation.

The phenomenon observed at SMP Negeri 2 Airmadidi reflects the real challenges of this integration. As a school that has implemented deep learning programs, it is supported by adequate digital facilities such as Chromebooks, internet access, and laboratories. In addition, teachers have received six months of specialized training in deep learning. However, evaluation results indicate a gap: students' learning motivation tends to decline, and many have not achieved the Minimum Learning Competency Criteria (KKTP). Field observations reveal that the use of digital media by teachers remains technical and one-directional, resulting in students acting as passive recipients rather than actively engaging in collaborative and challenging learning activities. This gap suggests that the main issue lies not only in the availability of facilities but also in teachers' ability to systematically plan and manage learning.

This issue of instructional management is crucial, as planning is a primary function that determines the success of the educational process. Teachers, as learning managers, are required to integrate deep learning principles and digital technology within a humanistic management framework, such as the POACH concept (Planning, Organizing, Actuating, Controlling, and Humanizing). Without effective management, digital technology will not significantly enhance students' intrinsic motivation. Based on this background, this study aims to identify and analyze the effect of teachers' ability to manage deep learning and the utilization of digital tools on students' learning motivation at SMP Negeri 2 Airmadidi. The scope of the study is limited to the variables of deep learning and the use of digital devices and applications during the teaching and learning process to support student engagement.

Specifically, this study seeks to answer whether there is a significant effect—both partially and simultaneously—of deep learning and digital utilization on students' learning motivation. The findings are expected to provide practical benefits for teachers in designing innovative learning strategies and serve as a reference for schools and education authorities in formulating more targeted digital transformation policies. Ultimately, the synergy between pedagogical depth and technological advancement is expected to create more active, interactive, and meaningful learning experiences for future generations.

II. LITERATURE REVIEW

1. Deep Learning

Deep learning is an approach that emphasizes comprehensive conceptual understanding through active student engagement, enabling learners to apply knowledge in various real-life contexts. According to Mu'ti (2025), this approach prioritizes mindful, meaningful, and joyful learning experiences to develop character and 21st-century skills. Similarly, Delialioglu (2021) states that deep learning encourages students to achieve higher-order thinking through activities involving analysis, evaluation, and creation.

In the context of educational management, teachers are required to systematically plan the implementation of this approach. Based on George R. Terry's concept, management consists of the functions of Planning, Organizing, Actuating, and Controlling (POAC). In its contemporary development, this concept has evolved into POACH (Planning, Organizing, Actuating, Controlling, and Humanizing), which places students at the center of the learning process (Hidayat, 2023). Effective planning must also accommodate the principle of constructive alignment between learning objectives, activities, and assessment (Setiawan, 2023).

The implementation of deep learning can be understood through the 8-3-3-4 framework proposed by Mu'ti (2025):

- The 8 dimensions of the Graduate Profile include faith, citizenship, critical reasoning, creativity, collaboration, independence, health, and communication.
- The 3 learning principles consist of Meaningful Learning, Mindful Learning, and Joyful Learning.

- The 3 learning experiences include understanding, applying, and reflecting.
- The 4 supporting frameworks include pedagogical practices, learning environment, digital technology utilization, and learning partnerships.

2. The Utilization of Digital Media in Learning

Digital learning media are technology-based tools that deliver information through multimedia elements such as text, images, audio, and video to enhance interactivity (Lestari & Anshori, 2024). The utilization of such technology can increase students' interest and motivation, as learning becomes more contextual for the digital generation (Karim & Hartati, 2021).

Teachers are required to integrate technology, pedagogy, and content in a balanced manner through the TPACK (Technological Pedagogical Content Knowledge) framework (Kurniawati et al., 2024). In addition, the SAMR model (Substitution, Augmentation, Modification, Redefinition) suggests that technology integration should be implemented progressively, from basic to transformative levels (Rukmana & Handayani, 2022). The main benefits of digital media include improving literacy skills (Yulianti et al., 2024), strengthening conceptual understanding (Meilina & Afriyah, 2024), and developing 21st-century skills (Puspita et al., 2025).

3. Learning Motivation

Learning motivation refers to internal and external drives that encourage students to actively engage, persist, and remain consistent in the learning process to achieve academic goals (Ryan & Deci, 2020). Sardiman (2022) explains that motivation has three main functions: to initiate action, to direct activities, and to select behaviors in order to achieve specific goals.

Learning motivation is divided into two types:

a. Intrinsic Motivation: Originates from within the individual, such as interest and curiosity.

b. Extrinsic Motivation: Arises from external factors, such as rewards, praise, or environmental demands.

Characteristics of students with high motivation include persistence in completing tasks, resilience in facing difficulties, a preference for independent work, and an enthusiasm for seeking and solving problems (Prisiska, 2021).

III. METHODS

This study employed a quantitative approach with an associative research design to examine relationships among variables using numerical data. The research was conducted at SMP Negeri 2 Airmadidi from December 2025 to February 2026.

The population consisted of all 606 students of SMP Negeri 2 Airmadidi. The sample was selected using purposive sampling based on the Taro Yamane (Slovin) formula with a 10% precision level, resulting in 92 respondents representing Grades VII, VIII, and IX.

The research variables include:

1. X1 (Deep Learning): Measured through students' perceptions of meaningfulness, engagement, and reflection in learning.
2. X2 (Digital Utilization): Measured through students' perceptions of accessibility, media attractiveness, and technology-based interaction.
3. Y (Students' Learning Motivation): Measured through aspects of enthusiasm, persistence, and achievement orientation.

Data were collected using a four-point Likert-scale questionnaire for primary data and semester grade documentation for secondary data. The instrument was considered valid, as all items had r-values greater than the r-table, and reliable, with a Cronbach's Alpha of 0.944 (above the 0.6 standard). Data analysis was conducted using SPSS through classical assumption tests (normality, linearity, multicollinearity, and heteroscedasticity) and multiple linear regression analysis. Hypothesis

testing was carried out using the t-test for partial effects and the F-test for simultaneous effects at a significance level of 0.05.

IV. RESULTS AND DISCUSSION

RESULTS

1. Description of Research Data

This study involved 92 respondents consisting of students from Grades VII, VIII, and IX at SMP Negeri 2 Airmadidi. The distribution of respondents was proportional: 30 students from Grade VII (32.6%), 31 students from Grade VIII (33.7%), and 31 students from Grade IX (33.7%). The descriptive statistics for each variable are as follows:

a. Deep Learning (X1): The mean score is 32.01 with a standard deviation of 3.49, indicating that students' perceptions of teachers' implementation of deep learning strategies fall into a good category.

b. Digital Utilization (X2): The mean score is 33.77 with a standard deviation of 3.81, suggesting that the use of digital technology in learning is considered good and relatively evenly implemented.

c. Students' Learning Motivation (Y): The mean score is 32.89 with a standard deviation of 3.99, indicating that students' learning motivation is generally in the good category.

Prior to further data analysis, validity and reliability tests were conducted. All 30 questionnaire items were found to be valid (r-count > r-table) and demonstrated a very high level of reliability, with a Cronbach's Alpha value of 0.944.

2. Classical Assumption Tests

a. Normality Test

The normality test was conducted using the Kolmogorov–Smirnov test with the assistance of SPSS. The criteria state that if the significance value (Sig.) > 0.05, the data are normally distributed; otherwise, if Sig. < 0.05, the data are not normally distributed.

Table 1. Normality Test Results for Deep Learning (X_1)

One-Sample Kolmogorov-Smirnov Test

		Pembelajaran Mendalam
N		92
Normal Parameters[a,b]	Mean	32.0109
	Std. Deviation	3.48780
Most Extreme Differences	Absolute	.088
	Positive	.088
	Negative	-.054
Test Statistic		.088
Asymp. Sig. (2-tailed)		.074[c]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.

Table 2. Normality Test Results for Digital Utilization (X_2)

One-Sample Kolmogorov-Smirnov Test

		Pemanfaatan Digital
N		92
Normal Parameters[a,b]	Mean	33.7717
	Std. Deviation	3.81179
Most Extreme Differences	Absolute	.090
	Positive	.071
	Negative	-.090
Test Statistic		.090
Asymp. Sig. (2-tailed)		.062[c]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.

Table 3. Normality Test Results for Students' Learning Motivation (Y)

One-Sample Kolmogorov-Smirnov Test

		Motivasi Belajar
N		92
Normal Parameters[a,b]	Mean	32.8913
	Std. Deviation	3.99301
Most Extreme Differences	Absolute	.064
	Positive	.063
	Negative	-.064
Test Statistic		.064
Asymp. Sig. (2-tailed)		.200[c,d]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.
d. This is a lower bound of the true significance.

Based on Tables 1, 2, 3, the significance values for Deep Learning (0.074), Digital Utilization (0.062), and Students' Learning Motivation (0.200) are all greater than 0.05. Therefore, it can be concluded that all variables are normally distributed and meet the normality assumption.

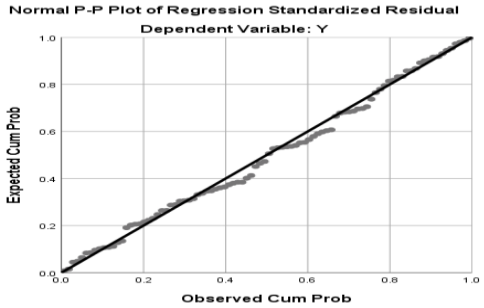

Fig 1. Normal Probability Plot Graph

Furthermore, the Normal Probability Plot shows that the data points are distributed around and follow the diagonal line, indicating that the residuals are normally distributed. Thus, the normality assumption is satisfied, and the regression model is appropriate for further analysis.

b. Linearity Test

The linearity test aims to determine whether there is a linear relationship between the independent variables and the dependent variable. The testing criterion is that the Deviation from Linearity F-value must be less than the F-table value

Table 4. Linearity Test Results of X_1 on Y

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Motivasi Belajar * Pembelajaran Mendalam	Between Groups	(Combined)	666.004	15	44.400	4.299	.000
		Linearity	315.639	1	315.639	30.562	.000
		Deviation from Linearity	350.365	14	25.026	2.423	.007
	Within Groups		784.909	76	10.328		
	Total		1450.913	91			

Table 4. Linearity Test Results of X_2 on Y

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Motivasi Belajar * Pemanfaatan Digital	Between Groups	(Combined)	705.419	15	47.028	4.794	.000
		Linearity	318.282	1	318.282	32.447	.000
		Deviation from Linearity	387.137	14	27.653	2.819	.002
	Within Groups		745.494	76	9.809		
	Total		1450.913	91			

Based on Tables 4 and 5, the calculated F-values are smaller than the F-table value (2.432 < 3.94 and 2.819 < 3.94). Therefore, it can be concluded that the relationships between the independent variables and the dependent variable are linear.

c. Multicollinearity Test

The multicollinearity test was conducted to ensure that the two independent variables—Deep Learning (X1) and Digital Utilization (X2)—are not highly correlated, allowing each variable to clearly explain its effect on Students' Learning Motivation (Y). The criteria used to detect multicollinearity are Tolerance > 0.10 and Variance Inflation Factor (VIF) < 10.

Table 6. Multicollinearity Test Results of X_1 and X_2 on Y

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	7.455	3.857		1.933	.056		
	Pembelajaran Mendalam	.403	.105	.352	3.837	.000	.895	1.117
	Pemanfaatan Digital	.371	.096	.355	3.868	.000	.895	1.117

a. Dependent Variable: Motivasi Belajar Murid

Based on Table 6, the Tolerance value is 0.895 and the VIF value is 1.117. Since the Tolerance value (0.895) is greater than 0.10 and the VIF value (1.117) is less than 10, the criteria for the absence of multicollinearity are satisfied. Therefore, it can be concluded that there is no multicollinearity among the independent variables in this regression model, indicating that the model is appropriate for further analysis.

d. Heteroscedasticity Test

The heteroscedasticity test aims to determine whether there is inequality in the variance of residuals across observations in the regression model. A good regression model should not exhibit heteroscedasticity, meaning it has constant residual variance. In this study, the test was conducted by examining a scatterplot of predicted values (ZPRED) and residuals (SRESID). If the points are randomly distributed above and below zero on the Y-axis without forming a specific pattern, it indicates the absence of heteroscedasticity.

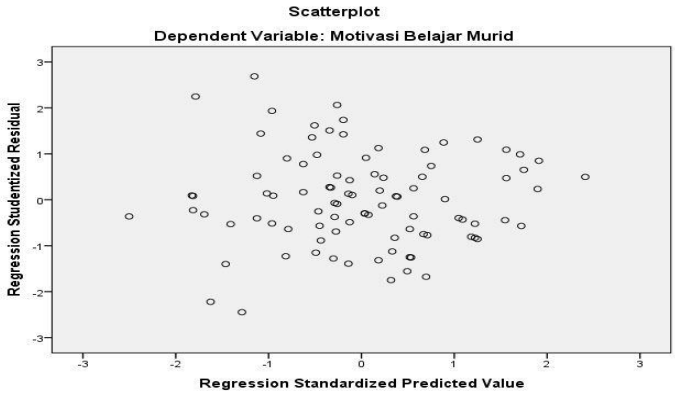

Fig 2. Scatterplot Graph

Based on Figure 2, the scatterplot shows that the data points are randomly distributed around the zero line and do not form any specific pattern such as a funnel or widening shape. This indicates that there is no heteroscedasticity in the regression model. Therefore, it can be concluded that the model meets the homoscedasticity assumption and is suitable for further analysis.

3. Multiple Linear Regression Analysis

Multiple linear regression analysis was used to examine the effect of Deep Learning (X1) and Digital Utilization (X2) on Students' Learning Motivation (Y).

Table 7. Results of Multiple Linear Regression Analysis

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	7.455	3.857		1.933	.056
	Pembelajaran Mendalam	.403	.105	.352	3.837	.000
	Pemanfaatan Digital	.371	.096	.355	3.868	.000

a. Dependent Variable: Motivasi Belajar

The regression equation in this study is **Y = 7.455 + 0.403X1 + 0.371X2**. The constant value of 7.455 indicates the level of learning motivation when the independent variables are equal to zero. The coefficients of X1 (0.403) and X2 (0.371) are positive, indicating that deep learning and digital utilization have a positive (direct) effect on students' learning motivation, meaning that increases in both variables will lead to higher learning motivation.

4. Hypothesis Testing

a. t-Test (Partial Test)

The t-test was used to examine the partial effect of each independent variable on the dependent variable. The criteria state that if the significance value < 0.05 or t-count > t-table, then H1 is accepted; otherwise, H1 is rejected.

Table 8. Results of Partial Test (t-Test)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	7.455	3.857		1.933	.056
	Pembelajaran Mendalam	.403	.105	.352	3.837	.000
	Pemanfaatan Digital	.371	.096	.355	3.868	.000

a. Dependent Variable: Motivasi Belajar

The results show that Deep Learning (X1) has a positive and significant effect on students' learning motivation, with a t-value of 3.873 > 1.987 and a significance value of 0.001 < 0.05. Similarly, Digital Utilization (X2) also has a positive and significant effect, with a t-value of 3.868 > 1.987 and a significance value of 0.001 < 0.05. Therefore, H0 is rejected and H1 is accepted.

b. F-Test (Simultaneous Test)

The F-test was conducted to determine whether Deep Learning (X1) and Digital Utilization (X2) simultaneously affect students' learning motivation (Y).

Table 9. Results of F-Test

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	479.020	2	239.510	21.933	.000[b]
	Residual	971.893	89	10.920		
	Total	1450.913	91			

a. Dependent Variable: Motivasi Belajar

b. Predictors: (Constant), Pemanfaatan Digital, Pembelajaran Mendalam

Based on the regression analysis, the F-value is 21.933 with a significance value of 0.000. Compared to the F-table value of 3.10 at α = 0.05 with df1 = 2 and df2 = 89, the result shows that 21.933 > 3.10 and 0.000 < 0.05. Therefore, H0 is rejected and H1 is accepted, indicating that Deep Learning and Digital Utilization simultaneously have a positive and significant effect on students' learning motivation.

V. DISCUSSION

1. The Effect of Deep Learning on Students' Learning Motivation

The results of the study indicate that Deep Learning has a positive and significant effect on Students' Learning Motivation ($t = 3.873$; Sig. $= 0.001 < 0.05$). This finding confirms that the first hypothesis is accepted. In other words, the better the implementation of deep learning by teachers, the higher the students' learning motivation.

In the context of Indonesian education, deep learning aligns with the concept of meaningful learning as proposed by Suyono and Hariyanto (2020), which emphasizes that learning should actively engage students' mental processes to achieve deep conceptual understanding rather than mere memorization. When students are involved in discussions, reflection, and problem-solving activities, their psychological needs to feel competent and valued are fulfilled, thereby enhancing their learning motivation.

According to Uno (2021), learning motivation is influenced by both internal and external factors. One of the most dominant external factors is the teacher's instructional strategy. Learning approaches that provide opportunities for exploration and active participation can significantly enhance students' intrinsic motivation.

These findings are consistent with Rahmawati (2022), who found that the implementation of reflection-based and active discussion learning in junior high schools significantly increased students' learning motivation. Similarly, Prasetyo and Widodo (2023) demonstrated that learning approaches emphasizing deep understanding positively affect students' motivation and engagement.
Therefore, this study reinforces that deep learning is a crucial factor in improving students' learning motivation at the secondary school level.

2. The Effect of Digital Utilization on Students' Learning Motivation

The results of the study indicate that Digital Utilization has a positive and significant effect on Students' Learning Motivation ($t = 3.868$; Sig. $= 0.001 < 0.05$). This finding confirms that the second hypothesis is accepted. In the context of Indonesian education, the use of digital technology has become an essential component in the implementation of the *Merdeka Curriculum*, which promotes technology-based learning. According to Munir (2021), the use of digital media in learning can enhance students' attention, interest, and motivation, as it makes the learning process more varied and interactive.

Arsyad (2020) also states that digital learning media serve attentional, affective, and motivational functions. This means that digital media not only facilitate the delivery of information but also stimulate students' interest and enthusiasm for learning. Similarly, Hidayat (2024) found that the integration of interactive digital media in learning significantly increases students' engagement and participation.

As noted by Susanto (2021), the effectiveness of technology in learning is highly dependent on teachers' competence in managing and integrating it pedagogically. Therefore, digital utilization must be carefully designed in alignment with learning objectives to ensure a meaningful impact on students' learning motivation.

3. The Effect of Deep Learning and Digital Utilization on Students' Learning Motivation

The results of the F-test indicate that Deep Learning and Digital Utilization simultaneously have a significant effect on Students' Learning Motivation ($F = 21.933$; Sig. $= 0.000 < 0.05$). Therefore, the third hypothesis is accepted.

This finding suggests that the combination of meaningful learning strategies and the use of digital technology has a stronger influence on learning motivation compared to when they are applied separately. According to Mulyasa (2021), 21st-century learning requires the integration of innovative pedagogical strategies and information technology. Meaningful learning becomes more effective when supported by interactive digital media.

A study by Nurhayati and Sari (2023) found that the integration of active learning approaches with digital media has a significant impact on students' motivation and learning outcomes. This is consistent with the findings of the present study, which demonstrate a strong simultaneous effect of both variables on students' learning motivation. Therefore, it can be concluded that the transformation of learning at SMP Negeri 2 Airmadidi—through the integration of deep learning and digital technology—is an appropriate strategy for enhancing students' learning motivation.

IV. CONCLUSION

Based on the results of data analysis and discussion aimed at addressing the research questions and objectives, the following conclusions are drawn:

1. **The Effect of Deep Learning on Students' Learning Motivation**

There is a positive and significant effect of deep learning on students' learning motivation at SMP Negeri 2 Airmadidi. This is evidenced by the t-test result, where the t-value (3.873) is greater than the t-table (1.987) with a significance level of 0.001 (< 0.05). This indicates that the better teachers implement learning strategies that emphasize deep conceptual understanding, reflection, and active engagement, the higher the students' learning motivation.

2. **The Effect of Digital Utilization on Students' Learning Motivation**

There is a positive and significant effect of digital utilization on students' learning motivation at SMP Negeri 2 Airmadidi. This is supported by the t-test result, where the t-value (3.868) is greater than the t-table (1.987) with a significance level of 0.001 (< 0.05). This finding suggests that effective integration of digital technology in the learning process, such as the use of interactive media, can enhance students' attention, interest, and enthusiasm for learning.

3. **The Simultaneous Effect of Deep Learning and Digital Utilization**

There is a significant simultaneous effect of deep learning and digital utilization on students' learning motivation at SMP Negeri 2 Airmadidi. The F-test result shows that the F-value (21.933) is greater than the F-table (3.10) with a significance level of 0.000 (< 0.05). This indicates that the combination of meaningful pedagogical strategies and the use of digital technology provides a much stronger contribution to improving learning motivation compared to when these variables are applied separatel.

4. **The Role of Learning Management**

The improvement of students' learning motivation is highly dependent on teachers' ability to manage learning through systematic and humanistic planning (POACH concept). Well-structured management, from planning to evaluation, ensures that digital technology is not merely used as a technical tool but is meaningfully integrated to create engaging, collaborative, and student-centered learning experience.

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