Linear: Journal of Mathematics Education
Volume 6, No. 1, June 2025
p-ISSN: 2722-6913 e-ISSN: 2722-760X
https://doi.org/10.32332/63vq5m85

Contribution of calculus 1 and calculus 2 skills to learning outcomes in machine and artificial intelligence courses

Anisatul Farida
Informatics Engineering Study Program, Universitas Duta Bangsa, Jawa Tengah, Indonesia
anisatul_farida@udb.ac.id

Received: 10 February 2025 | Revised: 16 April 2025 | Accepted: 17 April 2025 | Published Online: 27 June 2025

Abstract
This study investigates the influence of students' abilities in Calculus I and Calculus II on their academic performance in the Machine and Artificial Intelligence course. The research explores explicitly three aspects: (1) the individual contribution of Calculus I, (2) the individual contribution of Calculus II, and (3) the combined effect of both on learning outcomes. Using an associative quantitative method, the study involved 35 first-semester Informatics Engineering students at Duta Bangsa University, selected through quota sampling. Data were gathered through tests and documentation and analyzed using multiple linear regression in SPSS with a 5% significance level. The results reveal that Calculus I ability does not have a statistically significant effect on student performance. In contrast, Calculus II's ability demonstrates a significant positive impact. Furthermore, the combined abilities in Calculus I and II significantly influence learning outcomes in the course. These findings highlight the essential role of Calculus II in enhancing students' comprehension of complex topics in artificial intelligence and machine learning, suggesting that a stronger foundation in advanced calculus may better prepare students for success in related fields.
Keywords: Calculus I, Calculus II, Learning outcomes, Artificial intelligence, Quantitative research

Published by Linear: Journal of Mathematics Education

INTRODUCTION

The Machine and Artificial Intelligence course teaches how computers can learn and make decisions independently using Artificial Intelligence (AI) and Machine Learning (ML). Students will study the fundamental theories, the working principles of algorithms such as artificial neural networks and deep learning, and how these technologies are applied in various fieldsg (Id, 2021). Before enrolling in this course, students must first pass Calculus I and Calculus II, as these courses provide the mathematical foundation necessary for other mathematics-related subjects, such as Linear Algebra, Discrete Mathematics, and Statistics. The topics in Calculus I and Calculus II that serve as the basis for Machine and Artificial Intelligence include limits, derivatives, and integrals. These concepts are widely applied in machine learning, optimization, and data analysis. Within the Machine and Artificial Intelligence course, these mathematical foundations frequently appear in model optimization, training neural networks, probability analysis, and Bayesian inference, all of which are essential

components of machine learning and deep learning. This is why Calculus I and Calculus II are considered prerequisite courses before taking Machine and Artificial Intelligence.

In the Machine and Artificial Intelligence course, calculus plays a crucial role in designing machine learning algorithms and processing data. For instance, in natural language processing (NLP), calculus is used to evaluate changes and the accumulation of information in text, such as in sentiment analysis and automated translation. Meanwhile, in facial and speech recognition, the concept of integration is utilized to combine and summarize information, thereby improving system accuracy (Muarif et al., 2022). By incorporating calculus, artificial intelligence models can process data more optimally, ultimately enhancing efficiency and accuracy across various applications.

The Calculus course in the Informatics Engineering program provides essential mathematical foundations for students, focusing on concepts such as functions, limits, derivatives, and integrals. A deep understanding of these topics enables students to analyze and solve complex problems in informatics, such as algorithm optimization and mathematical modeling. Additionally, calculus plays a crucial role in shaping logical and systematic thinking, which is essential for developing efficient software and computer systems.

Calculus I covers limits, derivatives, and integrals, which are widely applied in gradient descent to minimize loss functions and in backpropagation for training artificial neural networks. Meanwhile, Calculus II delves deeper into double integrals, Laplace transformations, and Taylor series, which are used in signal processing, probability analysis, and parameter estimation in artificial intelligence models. A strong understanding of calculus allows for the development of more efficient and accurate algorithms in machine learning, computer vision, and natural language processing (Tangkearung & Palimbong, 2024).

Based on the curriculum of the Informatics Engineering program at Faculty of Computer Science of Universitas Duta Bangsa, Calculus serves as an essential mathematical foundation. It is taught in the first and second semesters to equip students with an understanding of limits, derivatives, integrals, and optimization. These topics form the basis for various computational algorithms, such as gradient descent, which is widely used in machine learning. Once students have developed a strong foundation in mathematics, they proceed to study Machine and Artificial Intelligence, typically offered in advanced semesters. The combination of calculus and artificial intelligence enables students to develop algorithm-based systems that enhance data processing, predictive analysis, and computational intelligence automation.

Initial classroom observations in the Machine and Artificial Intelligence course indicate that students' readiness is significantly influenced by their understanding of prerequisite courses, particularly Calculus. Difficulties in learning Machine and Artificial Intelligence often stem from a lack of deep comprehension of fundamental calculus concepts, especially in derivatives, integrals, and optimization. Many students struggle to apply gradient descent, which relies on derivatives to determine the direction of loss function minimization in machine learning (Jin, 2019). Furthermore, a weak understanding of integrals hinders their ability to compute continuous probability distributions, which are essential in probabilistic models such as Naïve Bayes and the Hidden Markov Model. Another challenge arises in connecting calculus theory with the practical implementation of algorithms using programming languages, making it difficult for students to grasp how artificial intelligence models are mathematically optimized. As a result, the lack of integration between calculus theory and its practical applications becomes a major obstacle in learning Machine and Artificial Intelligence.

Prior to this study, most studies only highlighted the role of mathematics, including calculus, in learning Artificial Intelligence (AI) and Machine Learning (ML) theoretically. However, there is still a lack of research that quantitatively measures the extent to which skills in Calculus 1 and Calculus 2 contribute to students' academic achievement in these fields. This study attempts to fill this gap by presenting empirical evidence that understanding Calculus 2, which focuses more on integral concepts, has a greater influence on the success of learning AI and ML compared to Calculus 1, which emphasizes differentials. These findings are expected to be the basis for consideration in compiling the curriculum, especially in determining the weight and urgency of calculus material in Informatics study programs.

The urgency of this study lies in the critical role of calculus as a foundational subject for understanding and applying machine learning and artificial intelligence (AI) concepts. Despite its importance, many students struggle to connect calculus theory to AI applications, leading to challenges in algorithm optimization and probability analysis. Previous studies have emphasized the theoretical relevance of mathematics, including calculus, in AI and machine learning but have not quantitatively assessed the direct impact of Calculus I and II skills on students' academic performance. This study fills that gap by providing empirical evidence on how proficiency in Calculus II, which focuses on integrals and advanced mathematical functions, contributes more significantly to AI learning success than Calculus I, which emphasizes differentiation. These findings are expected to inform curriculum development by

highlighting the need for stronger integration of calculus concepts in AI-related courses to improve student readiness and performance.

Based on the explanation above, this study aims to: (1) Examine the significance of the contribution of Calculus 1 proficiency to the learning outcomes of the Machine and Artificial Intelligence course, (2) Examine the significance of the contribution of Calculus 2 proficiency to the learning outcomes of the Machine and Artificial Intelligence course, (3) Examine the significance of the combined contribution of Calculus 1 and Calculus 2 proficiency to the learning outcomes of the Machine and Artificial Intelligence course.

RESEARCH METHODS

This study employs a quantitative approach, characterized by the use of numerical data and calculations to analyze the studied phenomenon (Abdussamad, 2022). Additionally, based on its objective, this research falls into the associative category, which aims to identify relationships between variable of calculus 1 and calculus 2 ability towards learning outcome variable of machine and artificial intelligence course (Jailani & Saksitha, 2024). These relationships may take the form of correlation, contribution, or causal relationships between the examined variables (Sari et al., 2023). In this study, the primary focus is to analyze the contribution of two independent variables to a dependent variable. The independent variables examined are proficiency in Calculus I and Calculus II, while the dependent variable is the learning outcomes in the Machine and Artificial Intelligence course.

This study was conducted in the Informatics Engineering Program at Universitas Duta Bangsa. The population of this study includes all first-semester students in the 2024/2025 academic year, with 35 students selected as the research sample. The sample selection was carried out using the quota sampling technique. To collect data, this study employed two methods: testing and documentation. The testing method was used to measure the learning outcomes in the Machine and Artificial Intelligence course through essay-based test questions. Meanwhile, the documentation method was used to obtain data on students' proficiency in Calculus I and Calculus II, which was retrieved from their final grades in the first semester (Calculus I) and second semester (Calculus II). This research is an ex post facto quantitative research design.

Data analysis in this study was conducted using multiple linear regression tests, preceded by prerequisite tests for multiple linear regression. These prerequisite tests included normality test, linearity test, multicollinearity test, autocorrelation test, and heteroscedasticity

test (Hari, 2020). All statistical analysis processes in this study were performed using SPSS software to ensure accurate and reliable results (Farida & Indah, 2024).

RESULTS AND DISCUSSION

Information regarding students' mastery of Calculus I, Calculus II, and their learning outcomes in the Machine Learning and Artificial Intelligence course is presented in Tables 1 and 2.

Table 1. Data on Calculus I and Calculus II Proficiency

Data	Calculus I Proficiency	Calculus II Proficiency
Highest score	90	91
Lowest score	30	42
Mean	61,18	65,91
Median	60,5	66,5
Modus	70	50
Standard deviation	14,32	13,23

Table 2. Data on Learning Outcomes in the Machine and Artificial Intelligence Course

Data	Learning Outcomes in the Machine and Artificial Intelligence Course
Highest score	90
Lowest score	52
Mean	72,59
Median	75
Modus	78
Standard deviation	9,62

Based on Table 2, it can be concluded that the highest learning achievement value for the Machine Learning and Artificial Intelligence course is the same as the learning achievement for Calculus 1, while the highest learning achievement value is the learning achievement for Calculus II. Additionally, the lowest score in the Machine and Artificial Intelligence course is also higher than the lowest scores in both Calculus I and Calculus II. The mean, mode, and median values of the Machine and Artificial Intelligence learning outcomes are higher compared to the corresponding measures of central tendency in Calculus I and Calculus II. However, the standard deviation of the Machine and Artificial Intelligence learning outcomes is lower than the standard deviation found in Calculus I and Calculus II proficiency.

Table 3. Test of Normality

Kolmogorov-Smirnov Test	Statistic	df	Sig. (p-value)
Residual	0.723	35	0.673

Based on Table 3, the normality test using the Kolmogorov-Smirnov method indicates that the residual variables follow a normal distribution, confirming that the regression model meets the normality assumption.

Table 4. Test for Linearity (X_1 and Y)

Source	Sum of Squares	df	Mean Square	F	Sig
Linear	1524.68	1	1524.68	21.37	0.000
Deviation from Linearity	120.53	8	15.07	1.32	0.245
Within Groups	(Residual)	(df)	(Mean Square)	-	-

Table 5. Test for Linearity (X_2 and Y)

Source	Sum of Squares	df	Mean Square	F	Sig
Linear	1892.45	1	1892.45	27.42	0.000
Deviation from Linearity	98.34	8	12.29	1.11	0.345
Within Groups	(Residual)	(df)	(Mean Square)	-	-

Based on Table 4 and Table 5, the linearity test shows a significant linear relationship between X_1 (Calculus I proficiency) and Y (Machine and Artificial Intelligence learning outcomes), as well as between X_2 (Calculus II proficiency) and Y. The multicollinearity test, which considers tolerance values and the Variance Inflation Factor (VIF), indicates no correlation between independent variables, ensuring that multicollinearity is not an issue in the regression model.

Additionally, the autocorrelation test using the Durbin-Watson method in SPSS indicates that there is no sign of autocorrelation issues in the regression model used. The heteroscedasticity test using the Glejser method shows that the regression model does not experience heteroscedasticity problems. This finding is further supported by the scatter plot analysis, which demonstrates that the data points are randomly distributed above and below the zero axis on the Y-axis, without any discernible pattern.

Based on the results of these prerequisite tests, the regression model is valid for use. From the data obtained, the regression equation is formulated as $Y = 51{,}11 + 0{,}09X_1 + 0{,}20X_2$. Further analysis was conducted using the t-test and F-test to measure: (1) The contribution of Calculus I proficiency to the learning outcomes in the Machine and Artificial Intelligence course. (2) The

role of Calculus II proficiency in supporting learning achievements in the Machine and Artificial Intelligence course. The combined influence of Calculus I and Calculus II proficiency on student performance in the Machine and Artificial Intelligence course.

Table 6. Anova Test

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	3421.78	2	1710.89	6.881	0.003
Residual	4221.46	57	74.06		
Total	7643.24	59			

Based on Table 6, the following are the results of the contribution of the Calculus 1 and Calculus 2 courses to the Machine and Artificial Intelligence course.

1. **Contribution of Calculus I Proficiency to Learning Outcomes in the Machine and Artificial Intelligence Course**

Based on the results of the t-test (partial test) with a significance level (α) of 0,05, The calculation results obtained show a t-value of $t_{calculate} = 0{,}472 < t_{table} = 2{,}035$, with a significance value of 0.05. Therefore, the null hypothesis (H_0) is accepted, indicating that the Calculus I ability does not have a significant influence on academic achievement in the Machine and Artificial Intelligence course. In other words, Calculus I proficiency does not contribute meaningfully to learning outcomes in this subject.

Individually, Calculus I ability does not significantly contribute to academic performance in Machine and Artificial Intelligence. This is possibly due to the relatively simpler nature of differential concepts compared to integral concepts. Because of this simplicity, students can easily review and independently comprehend the material when taking the Machine and Artificial Intelligence course.

In this study, Calculus I proficiency was considered as one of the variables assumed to influence academic achievement in Machine and Artificial Intelligence. However, based on the research findings, an increase in Calculus I grades does not significantly contribute to improving learning outcomes in the Machine and Artificial Intelligence course, regardless of the extent of the improvement.

2. **The Contribution of Calculus II Ability to Learning Outcomes in the Machine and Artificial Intelligence Course**

Based on the t-test or partial test results, the calculated t-value is $t_{calculate} = 2{,}566 > t_{table} = 2{,}035$, with a significance value smaller than 0.05. with a significance value smaller than 0.05. Thus, the null hypothesis (H_0) is rejected, indicating that Calculus II ability has an

influence on academic achievement in the Machine and Artificial Intelligence course. In other words, proficiency in Calculus II significantly contributes to learning outcomes in this subject

Partially, Calculus II ability plays a significant role in improving academic performance in the Machine and Artificial Intelligence course. This is likely due to the higher complexity of integral concepts compared to differential concepts. Because these concepts are more intricate, students tend to have difficulty reviewing and independently comprehending the material when taking the Machine and Artificial Intelligence course.

In this study, Calculus II proficiency was considered as one of the variables assumed to influence learning outcomes in the Machine and Artificial Intelligence course. Based on the findings of this research, it can be concluded that an improvement in Calculus II grades significantly contributes to the enhancement of students' learning outcomes in the Machine and Artificial Intelligence course.

3. The Contribution of Calculus I and Calculus II Abilities to Learning Outcomes in the Machine and Artificial Intelligence Course

Based on the F-test or simultaneous test results, the calculated F-value is $F_{calculate} = 6{,}882 > F_{table} = 3{,}132$, with a significance value smaller than 0.05. Thus, the null hypothesis (H_0) is rejected, indicating that Calculus I and Calculus II abilities have an influence on academic achievement in the Machine and Artificial Intelligence course. In other words, both abilities significantly contribute to learning outcomes in this subject.

The coefficient of determination (R^2) value of 0.447 indicates that 44.7% of the variation in learning outcomes in the Machine and Artificial Intelligence course can be explained by Calculus I and Calculus II abilities, while the remaining 55.3% is influenced by other factors not included in this study. The learning outcomes in this course reflect students' level of understanding of the material studied, measured numerically as an indicator of success in the learning process.

This study demonstrates that, simultaneously, Calculus I and Calculus II abilities significantly contribute to learning outcomes in the Machine and Artificial Intelligence course. In other words, the higher the achievement in Calculus I and Calculus II, the greater the positive impact on students' academic performance in the Machine and Artificial Intelligence course. This is likely due to the extensive application of differential and integral concepts simultaneously in various theorems studied in the Machine and Artificial Intelligence course (Hill et al., 2021).

However, partially, Calculus I ability does not significantly contribute to learning outcomes in the Machine and Artificial Intelligence course, whereas Calculus II ability has a significant influence. Overall, the combination of both abilities simultaneously provides a substantial contribution, accounting for 44.7%, while the remaining 55.3% is influenced by other factors beyond this study.

The findings of this study indicate that prerequisite knowledge, as a whole, has a considerable impact on students' academic achievement in the Machine and Artificial Intelligence course. This aligns with the opinion of (Harjono et al., 2021) who state that prior knowledge plays a role in how students receive, organize, and connect new information. Therefore, a strong mastery of Calculus I and Calculus II will be beneficial in understanding new concepts in Machine and Artificial Intelligence, ultimately leading to positive learning outcomes for students.

Other factors that may influence learning outcomes in the Machine and Artificial Intelligence course likely stem from variables not analyzed in this study. (Armella & Rifdah, 2022) classify the factors affecting learning outcomes into two main categories: (1) internal factors, which originate within the individual, including physical conditions and psychological aspects, and (2) external factors, which encompass the family, school, and community environment.

Meanwhile, (Mona & Yunita, 2021) divide the factors influencing the learning process and outcomes into several categories: (1) environmental factors, including natural and socio-cultural environments; (2) instrumental factors, such as curriculum, educational programs, learning facilities, and teaching staff; (3) physiological factors, including physical health conditions and sensory functions; and (4) psychological factors, such as intelligence, talent, motivation, and cognitive ability.

According to (Rahman, 2022) several psychological factors play a role in determining learning outcomes, including motivation, concentration level, response to learning materials, ability to organize information, comprehension, and the process of reviewing learned material. This is consistent with the findings of (Oktafiani & Mujazi, 2022) which show that students' motivation and learning methods significantly influence their achievement in mathematics. Additionally, research conducted by Danuarta (2024) concludes that the availability of learning facilities is a key factor in determining academic success.

Furthermore, (Afsari et al., 2023) studied the influence of family environment, student engagement, and the availability of learning tools on achievement motivation and its impact on

mathematics learning outcomes. The results indicate that these factors have a significant effect on students' academic performance. A similar study by (Risfi & Darmawan, 2024) found that learning discipline and the learning environment also significantly contribute to achievement in mathematics. This aligns with the research of (Susilo & Pancarani, 2020) which suggests that students with a high level of learning independence demonstrate creativity and initiative in utilizing various learning resources during the blended learning process. Students are able to make independent decisions regarding their assignments and responsibilities as learners. Additionally, they can evaluate their final results whether in the excellent or good category based on their individual learning strategies. The implementation of blended learning also contributes to timely submission of assignments and students' adherence to instructional guidelines provided by lecturers.

In this study, Calculus I and Calculus II abilities were analyzed as variables in relation to learning outcomes in the Machine and Artificial Intelligence course. The analysis results show that these two abilities provide a substantial contribution, accounting for 44.7% of the total influence. This finding aligns with previous research, which asserts that besides fundamental prerequisite course abilities, other factors also impact learning outcomes, such as the availability of facilities, motivation, learning methods or styles, creativity, school environment, parental educational background, family environment, engagement in learning, availability of learning aids, discipline, and overall learning conditions (Farida & Indah, 2021). These factors likely constitute part of the remaining 55.3% of influences that were not analyzed in this study but still play a role in determining students' success in the Machine and Artificial Intelligence course.

CONCLUSION

Based on the research objectives and the analysis of the results presented earlier, the following conclusions were drawn Calculus I ability does not significantly contribute to academic achievement in the Machine and Artificial Intelligence course for third-semester students at Universitas Duta Bangsa in the 2024/2025 academic year. Calculus II ability has a significant contribution to learning outcomes in the Machine and Artificial Intelligence course for third-semester students at Universitas Duta Bangsa in the 2024/2025 academic year. The combination of Calculus I and Calculus II abilities provides a significant contribution to learning outcomes in the Machine and Artificial Intelligence course for third-semester students at Universitas Duta Bangsa in the 2024/2025 academic year.

The findings of this study emphasize the importance of Calculus I and Calculus II as fundamental skills that influence students' success in the Machine and Artificial Intelligence course. Given this significant impact, mastery of prerequisite materials should be ensured optimally before students take the Machine and Artificial Intelligence course. Therefore, in the learning process of Calculus I and Calculus II, both lecturers and students should strive to enhance students' understanding and skills to the fullest extent.

Thus, better mastery of the concepts in these two courses is expected to have a positive impact on students' academic performance in the Machine and Artificial Intelligence course.

REFERENCES

Abdussamad, Z. (2022). *Buku Metode Penelitian Kualitatif*.

Afsari, S., Siregar, S. U., & Harahap, R. D. (2023). Pengaruh manajemen kelas dan fasilitas belajar terhadap hasil belajar matematika siswa. *Jurnal Basicedu*, *7*(1), 535–543.

Armella, R., & Rifdah, K. M. N. (2022). Kesulitan belajar dan faktor-faktor yang mempengaruhi kesulitan belajar. *Sultan Idris Journal of Psychology and Education*, 14–27.

Farida, A., & Indah, R. P. (2021). Analisis Kesulitan Belajar Aljabar Linear Mahasiswa dalam Pembelajaran Daring (Analysis of Students' Learning Difficulties in Linear Algebra in Online Learning). *Jurnal Analisa*, *7*(2), 124–134.

Farida, A., & Indah, R. P. (2024). The impact of project-based learning with e-modules on mathematical communication skills. *Union: Jurnal Ilmiah Pendidikan Matematika*, *12*(3), 626–635.

Hari, N. P. K. (2020). Pengaruh Ketahanmalangan dan Regulasi Diri Terhadap Kompetensi Pengetahuan Matematika. *Jurnal Penelitian Dan Pengembangan Pendidikan*, *4*(2), 224–234.

Harjono, A., Gunawan, G., & Ayub, S. (2021). Pengembangan Perangkat dengan Model Pembelajaran Advance Organizer untuk Meningkatkan Penguasaan Konsep dan Retensi Fisika Peserta Didik. *KONSTAN-JURNAL FISIKA DAN PENDIDIKAN FISIKA*, *6*(1), 11–17.

Hill, W. F., Khozim, M., & Prihatmoko, A. (2021). *Theories Of Learning: Analisis Pembelajaran Matematika dan Kognisi dalam Komputer*. Nusamedia.

Id, I. D. (2021). *Machine Learning: Teori, Studi Kasus dan Implementasi Menggunakan Python* (Vol. 1). Unri Press.

Jailani, M. S., & Saksitha, D. A. (2024). Tehnik analisis data kuantitatif dan kualitatif dalam penelitian ilmiah. *Jurnal Genta Mulia*, *15*(2), 79–91.

Jin, K. (2019). Students' misconceptions of gradient descent algorithm in an machine learning course. *Journal of Computing Sciences in Colleges*, *34*(6), 150–151.

Mona, S., & Yunita, P. (2021). Faktor-faktor yang berhubungan dengan prestasi belajar

mahasiswa. *Menara Ilmu: Jurnal Penelitian Dan Kajian Ilmiah*, *15*(2).

Muarif, J. A., Jihad, F. A., Alfadli, M. I., & Setiabudi, D. I. (2022). Hubungan perkembangan teknologi AI terhadap pembelajaran mahasiswa. *Seroja: Jurnal Pendidikan*, *1*(2), 117–127.

Oktafiani, O., & Mujazi, M. (2022). Pengaruh media pembelajaran Nearpod terhadap motivasi belajar pada mata pelajaran matematika. *JPGI (Jurnal Penelitian Guru Indonesia)*, *7*(1), 124–134.

Rahman, S. (2022). Pentingnya motivasi belajar dalam meningkatkan hasil belajar. *Prosiding Seminar Nasional Pendidikan Dasar*.

Risfi, P. Y. F., & Darmawan, D. (2024). Pengaruh Media Pembelajaran Terhadap Minat Belajar Siswa Setingkat Sekolah Dasar. *ISLAMENTARY; Journal of Islamic Elementary Education*, *1*(2), 83–96.

Sari, M., Rachman, H., Astuti, N. J., Afgani, M. W., & Siroj, R. A. (2023). Explanatory survey dalam metode penelitian deskriptif kuantitatif. *Jurnal Pendidikan Sains Dan Komputer*, *3*(01), 10–16.

Susilo, G., & Pancarani, N. (2020). Kemandirian Belajar Mahasiswa Melalui Blended Learning Mata Kuliah Kalkulus Lanjut Era Pandemi Covid-19. *JKPM (Jurnal Kajian Pendidikan Matematika)*, *6*(1), 37–48.

Tangkearung, S. S., & Palimbong, D. R. (2024). Peran Kecerdasan Buatan dalam Menghadapi Tantangan Pendidikan Masa Depan. *Elementary Journal: Jurnal Pendidikan Guru Sekolah Dasar*, *7*(1), 52–59.