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The Influence of the MURDER Learning Strategy on Understanding of IPAS in Grade V of SD AL-Azhar 1 Bandar Lampung

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Abstract
The low understanding of science concepts among elementary school students remains a problem influenced by teacher-centered learning. This condition requires the implementation of learning strategies that can activate students' cognitive processes systematically. This study aims to analyze the effect of the MURDER learning strategy assisted by Wordwall media on the understanding of science concepts in fifth grade students. The study used a quantitative approach with a quasi-experimental design of the pretest–posttest control group type. The research sample consisted of 52 students divided into an experimental class and a control class. Data were collected through a concept understanding test and analyzed using an independent t-test. The results showed a significant increase in concept understanding in the experimental class compared to the control class. This finding confirms that a structured cognitive learning strategy supported by interactive media is effective in significantly improving the understanding of science concepts.

Keywords : MURDER Strategy, Wordwall, Conceptual Understanding, IPAS

Introduction

The low understanding draft science integrated on participant educate school base Still become problem fundamental in system education , in particular on eye demanding science lessons integration knowledge scientific And social in a way conceptual (Muzammila Akram et al., 2023; Wahyuni et al., 2025; Rahayu et al., 2025) . Condition This happen Because science learning in schools base Still dominated by approach conventional which emphasizes memorization fact And delivery material verbally , so that Not yet fully develop thinking processes level tall participant educate (Nugroho et al., 2020; Ariawan, 2024; Putri et al., 2025) .

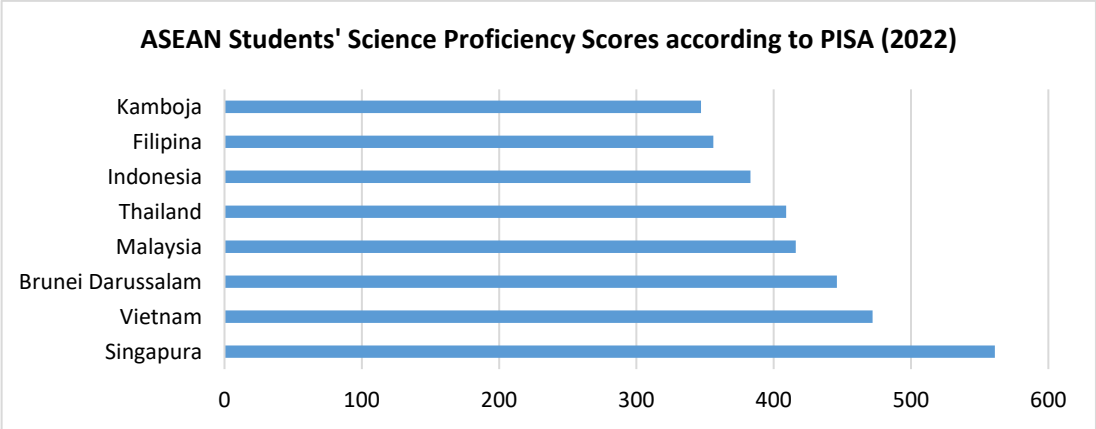

Figure 1. ASEAN Students' Science Ability Scores according to PISA (2022)

Internationally, the results of the 2022 *Programme for International Student Assessment* (PISA) showed that Indonesian students' scientific literacy scores were around 383 points, far below the OECD average of around 485 points, placing Indonesia in the lowest group of participating countries. More than 60% of Indonesian students only reached level 1 or below, indicating very limited ability to understand, reason, and apply simple scientific concepts (OECD, 2023) . These findings indicate that students do not yet have adequate conceptual understanding as a basis for scientific thinking.

In line with these conditions, nationally, the results of the National Assessment at the elementary school level show that the majority of students are still in the "needs intervention" and "basic" categories in literacy and numeracy aspects, which are directly correlated with low abilities to understand concepts and scientific reasoning (Yuda & Rosmilawati, 2024; Nafisah Qotrotun Nadda, 2025) . Data from the Ministry of Education, Culture, Research, and Technology reveals that less than 30% of elementary school students have reached the "proficient" category in their ability to reason and understand concepts as a whole (Dharma et al., 2022) . This fact confirms that science learning requires learning strategies that are not only oriented towards delivering material, but are able to activate students' cognitive processes systematically, deeply, and meaningfully (Muhammad Sururuddin et al., 2023; Septian Zuhri Kuncoro et al., 2025) .

These problems are also reflected in the implementation of learning in schools. Based on initial observations at Al-Azhar 1 Elementary School in Bandar Lampung, science learning in grade V has not fully supported students' in-depth and sustained understanding of concepts. Students still experience difficulties in re-explaining science concepts in their own words, linking concepts between topics, and applying concepts in everyday life contexts. Daily test data shows that of the 52 students in grades VB and VC, only 25 students achieved the Learning Objective Achievement Criteria (KKTP), while 27 students did not achieve the KKTP. This condition indicates that the majority of students still experience difficulties in understanding basic science concepts and applying them to problem-solving (Soeharto & Csapó, 2021) .

The low level of conceptual understanding needs to be a serious concern, considering that science learning serves as the foundation for the formation of scientific mindsets and reasoning abilities in students from an early age (van Eijck et al., 2025) . From an Islamic perspective, the importance of the thinking and understanding process is emphasized in Surah Al-'Alaq verses 1-5, which emphasize the command to read, understand, and examine as the basis for developing knowledge. This verse suggests that the learning process should not stop at memorization activities, but rather be directed towards understanding, processing, and developing knowledge meaningfully.

Literature review shows that conceptual understanding cannot be achieved through passive learning, but rather through a structured and continuous cognitive process (Guntur & Purnomo, 2024) . Several opinions from researchers Putri Widiyanti, (2019) , Suriyah et al., (2022) , and Femin & Muhsam, (2023) , explain that the MURDER (Mood, Understand, Recall, Digest, Expand, Review) learning strategy is designed to optimize the learning process through mood management and systematic cognitive activities so that students are able to understand and remember information more effectively. Zhai et al., (2023) and Putri et al., (2025) through their meta-analysis showed that learning strategies involving self-regulation and reflection have a significant impact on improving conceptual understanding. Mystakidis, (2021) , stated that conceptual understanding will be optimal if students integrate new knowledge with prior knowledge through active information processing. Research by Tegeh et al., (2021) and Thomann & Deutscher, (2025) , emphasizes the importance of active learning, self-regulation, and structured cognitive scaffolding in building deep conceptual understanding.

Although the MURDER strategy has been extensively researched in the context of reading, language, and higher education, studies specifically examining its application in elementary school science learning are still very limited (Sahib & Saleh, 2023; Ramadhan et al., 2024) . Most previous research has not focused on understanding science concepts as a primary learning outcome, especially at the fifth grade level. Furthermore, research conducted in the context of private elementary schools based on academic excellence in Indonesia is still rare. This condition indicates a research gap that needs to be filled through empirical studies that are more contextual and relevant to the needs of science learning.

Based on these gaps, the novelty of this research lies in the comprehensive application and testing of the MURDER learning strategy in fifth-grade elementary school science learning. This strategy integrates learning atmosphere management (mood), active understanding (understand), memory strengthening (recall), information processing (digest), concept development (expand), and final reflection and reinforcement (review) as a systematic learning unit. In the expand phase, students not only understand the basic concepts of science, but also develop them through application activities, such as designing simple experiments on changes in the state of objects, linking the concept of force to everyday game phenomena, or creating concept maps to explain the relationship between the concept of energy and its changes. Through these activities, students are trained to transfer knowledge to new contexts meaningfully. The MURDER learning approach with its integrated stages is still rarely studied in the context of elementary education in

Indonesia, especially in science subjects, so this research has significant theoretical and practical contributions.

The urgency of this research is further strengthened given that science is a fundamental subject in developing scientific literacy, reasoning skills, and critical thinking skills in students from elementary school onward. Without appropriate learning strategies, poor conceptual understanding of science has the potential to negatively impact the quality of learning at subsequent levels of education. In line with the direction of national education policy, which emphasizes conceptual understanding and reasoning-based learning, empirical evidence is needed regarding effective, systematic learning strategies that are appropriate to the characteristics of elementary school students.

Thus, this study aims to empirically analyze the influence of the MURDER learning strategy on the understanding of science concepts of fifth-grade students at Al-Azhar 1 Elementary School, Bandar Lampung. The results of the study are expected to provide theoretical contributions in the development of cognitive-based learning strategy studies, as well as practical contributions for teachers in designing more effective, meaningful, and conceptually understanding-oriented science learning.

Method

This study used a quantitative approach with a quasi-experimental design to test the effect of the MURDER (Mood, Understanding, Recall, Digest, Expand, and Review) learning strategy assisted by Wordwall media on students' understanding of science concepts. The general design used was the Pre-Test–Post-Test Control Group Design, which involved an experimental class and a control class, as applied in educational research to test cause-and-effect relationships when full subject randomization is not possible (Denny et al., 2023). The population of this study was all fifth-grade students of SD Al-Azhar 1 Bandar Lampung, in the 2025/2026 academic year, totaling 77 students. The sample was determined by a random class selection technique, with class VA as the experimental class, class VB as the experimental class instrument, and class VC as the control class, resulting in a total sample of 52 students. This study was conducted in the odd semester of the 2025/2026 academic year. The independent variable in this study was the MURDER learning strategy supported by Wordwall, while the dependent variable was students' understanding of science concepts. To minimize the influence of external variables, the open-ended materials, time allocation, supervising teacher, and test instrument indicators and grids were standardized across both groups.

The MURDER learning strategy was implemented through a learning flowchart that integrated each stage of MURDER with Wordwall features. The first stage, Mood, utilized the "Motivation Clap" technique to build students' readiness and motivation to learn before the lesson began. The next stage, Understanding, utilized the "Understanding Through Pictures and Explanations" method to help students grasp science concepts through relevant pictures and explanations. In the Recall stage, students exercised their memory through the "Gameshow Quiz" provided by Wordwall, allowing them to recall previously learned concepts. The next stage, Digest, involved group work and answering in-depth questions to clarify students' understanding of the material. In the Expand stage, students were asked to explain the information they obtained from the provided pictures to broaden their understanding and apply the concepts in a broader context. Finally, the review phase was conducted through an "Open the Box" game on the Wordwall, which allowed students to reflect on their learning outcomes and identify the understanding they had achieved. The entire research process was conducted in accordance with ethical principles of educational research, which included obtaining official permission from the school, protecting student identities, and using research data exclusively for academic purposes.

Figure 2. MURDER steps flowchart

The research instrument was a test of understanding the concept of science in the form of descriptive questions arranged based on the indicators of understanding the concept. Data were collected through pretest and posttest, then scored using a scoring rubric with a value range of 0–100. The validity test of the instrument was carried out using Pearson Product Moment correlation, which showed that 11 of the 15 questions were declared valid, while the reliability test using Cronbach's Alpha produced a value of 0.838 for the pretest and 0.841 for the posttest, which is included in the reliable category (Putri Ayu et al., 2025) . Data analysis was carried out using parametric statistics, starting with the Kolmogorov–Smirnov normality test and Levene's homogeneity test as prerequisite tests, then continued with the Independent Samples t-test at a significance level of 0.05 to test the hypothesis that there is an influence of the MURDER learning strategy assisted by Wordwall on students' understanding of science concepts. The stages of research implementation include the preparation stage (preparation and testing of instruments), the implementation stage (administering pretests and applying treatments to the experimental class and conventional learning to the control class), the evaluation stage (administering posttests), and the analysis and reporting stages of research results, in accordance with the quasi-experimental research procedures recommended in international educational methodology studies (Stratton, 2019; Park et al., 2020) .

Results and Discussion

1. Validity Test

Instrument validity testing was conducted to ensure that each item in the social sciences concept understanding test accurately measured the intended construct. Validity testing was conducted using Pearson's Product Moment correlation by comparing the calculated r and table r values at a 5% significance level. Based on the number of respondents in the instrument trial, the table r value was 0.369. An item is considered valid if the calculated r value is greater than the table r value.

Table 1. Results of the Validity Test

No	Criteria	Number Question	Amount
1	Valid	1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 14,	11
2	Invalid	7, 12, 13, 15	4

Source: SPSS Data Processing Version 29

The analysis results show that of the 15 questions used in the pretest and posttest instruments, there are 11 questions that have a calculated r value greater than the table r and are therefore declared valid. Conversely, the other 4 questions have a calculated r value smaller than or equal to the table r and are therefore declared invalid and are not used in further data analysis. Thus, the research instrument used to measure understanding of the concept of science and natural sciences consists of 11 questions that have met the validity criteria.

The analysis results showed that of the 15 items developed for the pretest and posttest instruments, 11 had a calculated r value greater than the table r and were therefore declared valid. Meanwhile, the other 4 items had a calculated r value smaller than or equal to the table r and were therefore declared invalid. The invalidity of these four items was suspected to be caused by low discriminatory power and a mismatch between the question formulation and the measured conceptual understanding indicators. Therefore, the invalid items were eliminated from the research instrument. The elimination of these items did not reduce the representation of the previously planned indicators of understanding of the concepts of science and natural sciences, because each main indicator was still represented by at least one valid item. Thus, the research instrument used subsequently consisted of 11 items that statistically and substantively met the validity criteria for measuring understanding of the concepts of science and natural sciences.

2. Test Reliability

In addition to validity, instrument reliability was tested to determine the level of internal consistency in measuring the ability to understand science concepts. Reliability testing was conducted using the Cronbach's Alpha coefficient. An instrument is considered reliable if the Cronbach's Alpha value is greater than 0.60.

Table 2 . Results Test Reliability

Type Test	Cronbach's Alpha	Amount Item
Pretest	0.838	15
Posttest	0.841	15

Source: SPSS Data Processing Version 29

Based on the reliability test results, a Cronbach's Alpha value of 0.838 was obtained for the 15 instrument items. This value is included in the high category, indicating that the instrument has a good level of internal consistency and is able to produce reliable data. An instrument is declared reliable if the Cronbach's Alpha value is > 0.60. Thus, the Cronbach's Alpha value of 0.838 for the pretest questions and 0.841 for the posttest questions indicates that the instrument in this study is reliable and suitable for use as a data collection tool.

3. Test Prerequisite Analysis

a. Test Normality

The normality test is used to determine whether sample data comes from a population that is normally distributed or close to normal. This test is conducted to ensure that the pretest and posttest scores in both the experimental and control classes meet the basic assumptions of parametric statistics, namely that the data must be normally distributed before further analysis, such as the t-test, is conducted.

Table 3. Results of the Normality Test (Kolmogorov–Smirnov)

Class	Statistics	df	Sig.	Shapiro–Wilk Statistics	df	Sig.
Pretest Control	0.099	26	0.200*	0.951	26	0.244
Posttest Control	0.138	26	0.200*	0.951	26	0.245
Experiment Pretest	0.120	26	0.200*	0.954	26	0.290
Experiment Posttest	0.138	26	0.200*	0.935	26	0.101

* This is a lower bound of the true significance
a. Lilliefors Significance Correction

Source: SPSS data processing version 29

Based on the results of the normality test using Kolmogorov–Smirnov, it was found that in the control class, the pretest significance value was 0.200 and the posttest significance value was 0.200. Meanwhile, in the experimental class, the pretest significance value was 0.200 and the posttest significance value was 0.200. All significance values were greater than 0.05, so it can be concluded that the learning outcome data in both classes were normally distributed.

4. Anomaly (Outlier) Data Check

In addition to the normality test, an outlier check was performed to ensure there were no extreme values that could potentially influence the results of the parametric statistical analysis. The outlier check was performed using standardized score (z-score) analysis of the pretest and posttest data in the experimental and control classes.

The criteria used to identify anomalous data is a z-score value that falls outside the range of -3.00 to +3.00. Data with a z-score value outside this range is considered anomalous and should be considered for elimination or special handling.

Table 4. Results of Examination of Anomalous Data Using Z-Score

Group	Type Test	Minimum Z-Score	Maximum Z-Score	Information
Class Control	Pretest	− 1.87	2.04	No there are outliers
Class Control	Posttest	− 1.92	2.11	No there are outliers
Class Experiment	Pretest	- 1.75	2.26	No there are outliers
Class Experiment	Posttest	− 1.68	2.34	No there are outliers

The analysis results showed that all z-scores for the pretest and posttest data, both in the experimental and control classes, fell within the range of -3.00 to +3.00. Therefore, no anomalous data were found in any of the study groups. All data were deemed valid and used in further statistical analysis without any special treatment.

5. Test Homogeneity

The homogeneity test is used to determine whether several population variants are equal or not. (Sianturi, 2022) Test similarities two variance used For test whether distribution of the data homogeneous or no , that is with compare second group (class experiment And control).

Table 5. Results Test Homogeneity

Base Testing	Levene Statistics	df1	df2	Sig.
Based on Mean	0.183	1	50	0.671
Based on Median	0.194	1	50	0.662
Trimmed Mean	0.181	1	50	0.673

Source: SPSS Data Processing Version 29

Based on the calculation results, the Sig. = 0.671 value was obtained in the test based on the mean, Sig. = 0.662 in the test based on the median, and Sig. = 0.673 in the test based on the trimmed mean. All significance values are greater than 0.05. Thus, it can be concluded that the learning outcome data in the control class and the experimental class have the same variance or are homogeneous.

6. Test Hypothesis

Hypothesis testing is a decision-making method based on the analysis of previously obtained data. Hypothesis testing aims to determine whether a hypothesis is accepted or rejected based on population parameters. (Utami & Hadiprayitno, 2024) .

For test hypothesis in study this , used *Independent Sample t-Test* . This test is used to determine whether there is a difference in average learning outcomes between two unpaired samples , namely between the control class and the experimental class. Student learning outcome data from both classes was analyzed using the *t-test* technique .

Table 6. Results t test (Independent Sample t-Test)

Results	Assumptions Variance	Levene's Test F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Standard Error Difference	95% CI Lower	95% CI Upper
	Equal variances assumed	0.183	0.671	-3,785	50	0.000	-14,885	3,932	-22,783	-6,987
	Equal variances not assumed	—	—	-3,785	48,989	0.000	-14,885	3,932	-22,783	-6,987

Source: SPSS Data Processing Version 29

After it was known that the data was normally distributed and had homogeneous variance, a hypothesis test was conducted using *the Independent Samples t-test* to determine whether there was a difference in learning outcomes between the control class and the experimental class. Based on the results of the t-test, the calculated t value was obtained = -3.785 with degrees of freedom (df) = 50 and a significance value (Sig. 2-tailed) = 0.000. Because the significance value is smaller than 0.05 (0.000 < 0.05), it can be concluded that there is a significant difference between student learning outcomes in the control class and the experimental class. Based on the average value (mean), the control class has an average of 63.15, while the experimental class has an average of 78.04.

7. Comparison of Average Learning Outcomes

A comparison of the average posttest scores showed that the experimental class obtained an average score of 78.04, while the control class obtained an average score of 63.15. The difference in average scores indicates a higher increase in understanding of science concepts in students who participated in learning with the MURDER strategy assisted by Wordwall media.

Table 7. Comparison of Posttest Mean Scores

Group	Average value
Class Control	63.15
Class Experiment	78.04

Source : SPSS Data Processing Version 29

With thus , it can interpreted that Strategy Learning *Murder (Mood, Understand, Recall, Digest, Expand And Review)* Wordwall Media Assisted on class experiment give significant influence to understanding IPAS concept compared with learning carried out in class control .

Based on the results of quantitative data analysis and observational findings during the learning process, it can be stated that the implementation of the MURDER learning strategy assisted by Wordwall media has a significant impact on improving the understanding of science concepts of fifth grade students. This is indicated by the difference in the average posttest score between the experimental class (78.04) and the control class (63.15) as well as the results of the Independent Samples t-test which showed a significance value of 0.000 < 0.05. Pedagogically, this improvement is not only quantitative, but also reflected in the quality of the student learning process. The Mood stage is able to create a conducive learning atmosphere, the Understand and Recall stages help students understand and recall concepts, while Digest and Expand encourage students to process and relate concepts in more depth. The Review stage which is reinforced through the Wordwall game plays an important role in strengthening the retention and understanding of science concepts. These results confirm that learning that places students as active subjects is able to improve the quality of conceptual understanding compared to expository learning such as Direct Instruction (Hattie, 2023 ; Dubinsky & Hamid, 2024; Faturrachim et al., 2025) .

The findings of this study are in line with the results of previous studies which stated that the MURDER strategy is effective in improving students' conceptual understanding and learning outcomes (Nurita, 2022; Subekti et al., 2022; Afifah et al., 2023) Similar results were also found with the research of

Femin & Muhsam, (2023) and Tegeh et al., (2021) , which confirmed that the MURDER stage is able to optimize students' self-regulation and cognitive processes through structured learning. In addition, the use of Wordwall as a gamification-based media supports the findings of Mystakidis, (2021) and Mardhiyah, (2023) , which stated that interactive digital media can increase attention, motivation, and strengthen students' long-term memory. In contrast to several previous studies that mostly studied MURDER in language or mathematics subjects, this study expands the study by proving the effectiveness of the MURDER strategy in the context of science learning in elementary schools. Thus, the results of this study not only confirm previous findings but also enrich the treasure trove of research on science learning based on cognitive strategies and interactive digital media.

The findings of this study have important theoretical and practical implications. Theoretically, the results reinforce the constructivist view that conceptual understanding is formed through an active, reflective, and hierarchical process, not simply passively receiving information. The integration of the MURDER strategy with Wordwall demonstrates that thought process management and digital media support can complement each other in building understanding of science concepts (Tegeh et al., 2021) . Practically, the results of this study provide a strategic alternative for elementary school teachers to address the low understanding of science concepts through the implementation of more varied, interactive, and meaningful learning. This model is also relevant to the demands of 21st-century learning because it can develop critical thinking skills, collaboration, intrinsic motivation, and digital literacy in students (Todd et al., 2021) . Therefore, the MURDER strategy assisted by Wordwall can be recommended as an applicable and contextual innovation in science learning.

Despite showing positive results, this study has several limitations that need to be considered. First, the study was conducted in only one school with a relatively limited sample size, so generalizing the findings to other school contexts requires caution. Second, this study focused on conceptual understanding as the dependent variable, so it did not comprehensively examine the effect of the MURDER strategy supported by Wordwall on other aspects of learning outcomes, such as science process skills, scientific attitudes, and student creativity. Third, the relatively short treatment duration limited this study's ability to reveal long-term impacts, particularly on concept retention. Furthermore, the use of digital media such as Wordwall requires adequate technological infrastructure, so the implementation of this strategy in schools with limited access to technology requires further study. Therefore, future research is recommended to involve a wider sample, vary school characteristics and contexts, and explore alternative supporting media that are simpler or non-digital based so that the MURDER strategy can still be implemented adaptively and inclusively in various school conditions.

Conclusion

Based on the results of statistical analysis and empirical findings during the learning process, it can be concluded that the MURDER (Mood, Understand, Recall, Digest, Expand, and Review) learning strategy assisted by Wordwall media has a positive and significant effect on improving the understanding of science concepts of fifth grade students of Al-Azhar 1 Elementary School, Bandar Lampung. This is indicated by the results of the Independent Samples t-test with a significance value of 0.000 < 0.05 as well as a significant difference in the average posttest score between the experimental class (78.04) and the control class (63.15). These findings confirm that the implementation of structured MURDER stages, combined with gamification-based digital media, is able to optimize students' cognitive processes, increase motivation and learning engagement, and strengthen understanding and retention of science concepts more meaningfully than conventional learning.

Theoretically, the results of this study strengthen the constructivist view that conceptual understanding is formed through an active, reflective, and hierarchical learning process, and expand empirical studies related to the effectiveness of the MURDER strategy in the context of science learning in elementary schools. Practically, the MURDER strategy assisted by Wordwall can be recommended as an alternative model for effective and applicable science learning. However, this study still has limitations in the scope of the sample and the variables studied. Therefore, further research is recommended to involve a wider range of subjects, diverse school contexts, and examine the impact of this strategy on other aspects of learning outcomes and long-term retention to obtain a more comprehensive understanding.

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