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The Effect of Integrative Learning on Improving Understanding of Science Concepts of Grade V Elementary Students Public School 40 Negeri Katon

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ABSTRACT

The problem in this study is the low learning outcomes of fifth grade students of SD Negeri 40 Negeri Katon Pesaaran. The purpose of this study was to determine the effect of integrative learning on increasing the understanding of science concepts of Class V Students of Elementary School Negeri 40 Negeri Katon. The research method used in this research is Quasi Experiment can be interpreted as research that is close to experiments or pseudo experiments. This research design uses a "non-equivalent control-group design", then the two groups are both given a pre-test and post-test, but only the experimental group is given treatment in this study taken using Purposive Sampling technique. Data collection techniques using concept understanding tests, observation and documentation with data analysis using simple linear regression tests the results showed that r count 0 with N = 20 for α = 0.05 obtained r table 0.444; so that r count> r table (0>0.444). Then R square = the magnitude of the termination coefficient (carrying capacity) of the independent variable (Integrative Learning model) in predicting the magnitude of the dependent variable (understanding of the science concept of students) of 0. So it can be concluded that there is an effect of Integrative Learning on increasing the understanding of science concepts of Class V Students of State Elementary School 40 Negeri Katon in the 2023/2024 school year.

Keywords*: *integrative learning, understanding concepts, science

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INTRODUCTION

Mastery of science concepts is very important for students to have so that students can solve related problems in everyday life according to (O'Dwyer et al, 2015: 23). This is in accordance with the learning objectives of science, namely to master science concepts and their interrelationships and be able to use scientific methods based on scientific attitudes to solve the problems they face according to (Gunawan, 2011: 60). Learners who have mastery of concepts can develop the ability to apply facts, scientific concepts, principles, laws and theories used by scientists to explain and predict observations from nature according to (Knaggs, 2012: 196). This opinion is supported by (Jacobson and Bergman, 1991: 45) which states that the characteristics of science include a collection of concepts, principles, laws, and theories. These science concepts must be mastered well so that if they encounter daily problems related to these concepts, students can use them in solving existing problems. One of the objectives of science in SD / MI according to Permendiknas No. 22 of 2006 is to develop knowledge and understanding of science concepts that will be useful and can be applied in everyday life according to Rusilowati (2015: 56).

To achieve meaningful science learning and be able to activate students to master the concepts of science learning materials that can be applied by students in everyday life, the role of educators is very influential in the learning process. Science learning is not passive learning, where classroom behavior and knowledge dissemination are controlled and determined by educators, while students are only seen as objects

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receiving what educators give according to Pranata et al. (2021: 56). Therefore, science learning emphasizes more on active learning, where students are the subject and object.

In the learning process, students have the basis to develop optimally according to their abilities. This can be seen based on the purpose of learning science in elementary school which emphasizes more on developing the ability of students. Understanding science concepts is very important for students. The concepts that students understand will affect the mastery of the next concept. This is because the concepts in science lessons are related to each other according to (Asih, 2013: 11). Understanding science concepts owned by elementary school students is a milestone in understanding other science concepts at the next level of education. For this reason, the understanding of science concepts possessed by elementary school students must be high.

Understanding the concepts possessed by students is one form of learning outcomes obtained through learning. Learners are said to understand the concept if they have the ability to understand or understand something from various aspects according to Novanto et al (2021: 205). Learners can provide an explanation or give a more detailed description of it using their own words. This shows that the understanding of science concepts possessed by Indonesian students is still low. Based on the results of direct interviews with grade V teachers, especially in classes V A and V B by directly observing activities during the learning process at SDN 40 Negeri Katon in the 2023/2024 academic year, explained several problems, namely researchers obtained information that students have not been able to understand science concepts optimally. It can be seen when the students' learning outcomes are still below the Minimum Completeness Criteria (KKM). Because during the learning process students find it difficult to accept the teacher's explanation, because according to students science lessons are difficult because science in elementary school is a lesson that contains several subjects in one lesson so that it is confused. Besides paying attention to children's cognitive development, the learning model must provide new nuances in learning for students according to Handayani (2019: 124).

Learning models that can integrate and develop students' mastery of concepts so that the expected competencies are achieved. Based on these problems, one of the learning models that can improve students' concept understanding is the Integrative learning model. Integrative learning model is one of the learning models that can develop students' concept understanding according to Lia (2016: 89-96). Educational experts have done a lot of research on integrative learning. Therefore, students are more in-depth to understand science concepts according to Azizah (2014: 1-8). The advantages of integrative learning can be seen from the last learning phase, which is the broad evaluation phase. This phase provides opportunities for learners to think liberally. Integrative learning is a liberal education, so it is more flexible to develop learners' abilities holistically according to Wingert, et al (2011: 34-57) to explore what is learned. Based on the above problems, the researcher is motivated to conduct research in class V entitled "The effect of integrative learning on increasing the understanding of science concepts of Class V Students of State Elementary School 40 Negeri Katon". This study aims to analyze the effect of integrative learning models in improving the understanding of science concepts among fifth grade students at the State Elementary School 40 Negeri Katon. The purpose of this study is to evaluate how integrative learning improves students' understanding of science concepts and their ability to apply these concepts in solving real-life problems. In addition, the study also aimed to understand how the integrative learning approach impacts on students' overall learning experience and academic achievement.

METHOD

The method used in this research is Quasi Experiment with non-equivalent control-group design. Sugiyono (2017: 79). The research was conducted at State Elementary School 40 Negeri Katon during the 2023/2024 academic year. The procedure included selecting experimental and control groups, administering pre-tests and post-tests, and applying the integrative learning model to the experimental group while using conventional learning in the control group.

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The instruments used in this study were tests to measure students' understanding of science concepts, observation sheets to monitor the learning process, and questionnaires for collecting feedback on students' learning experiences. Data were analyzed using descriptive statistics to compare pre-test and post-test scores and inferential statistics to assess the significance of the results.

Table 1. Research design

Group	*preTest*	Treatment	*Posttest*
E	X_1	X_1	O_1
K	X_2	X_2	O_2

Description:
E : The experimental group is randomly selected
K : Non-experimental group randomly selected
X_1 : Treatment using *integrative learning* model
X_2 : Treatment using the model used at school.
O_1 : Experimental class *posttest* (final test)
O_2 : Non-experimental class *posttest* (final test)

The research was conducted by taking a sample of two classes, namely class V A which amounted to 20 students. The data obtained are pretest data, cognitive data on understanding of science concepts, pretest data is data to determine the initial ability of students before *Integrative Learning learning*. Cognitive data is knowledge data to see students' understanding of science concepts on theme 6 subtheme 3 temperature and heat material. Posttest data, namely learning outcome data, is data on understanding of science concepts after learning theme 6 subtheme 3 temperature and heat material using *Integrative Learning is* complete. The data analysis technique using the *Simple Linear Regression Test* in this study was carried out using the *Microsoft office excel* application. *The* hypothesis to be tested in this study is as follows:

H_a : There is an effect of *integrative learning* on improving the understanding of science concepts. Class V Students of Elementary School Negeri 40 Negeri Katon
H_0 : There is no effect of *integrative learning* on improving understanding of science concepts. Class V Students of Elementary School Negeri 40 Negeri Katon

RESULTS AND DISCUSSION

Research on the effect of integrative learning on improving the understanding of science concepts of Class V Students of State Elementary School 40 Negeri Katon theme 6 subtheme 3 with temperature and heat material. The learning process took place for three face-to-face sessions with an allocation of two lesson hours consisting of 40 minutes per lesson hour. In this study, the experimental class used was class VA. The implementation of learning in this class was attended by 20 students and was carried out by adjusting the science lesson schedule at school. Meanwhile, the non-experimental class used consisted of 20 students, with the entire learning process of three meetings. The results obtained from this study are quantitative data which are then processed. The instrument used in the study in the form of a Two-Tier Multiple Choice test question on the results of understanding the science concept of the cognitive domain, first to find out whether or not the question is used for research. In order for the data to be reliable, the validity test is carried out on each item. There are 14 valid questions, out of 20 questions tested, which represent indicators of concept understanding. The reliability test shows that the question instrument to be used is reliable.

The average value of the results of understanding the concept of science is normally distributed with a Sig value. (2-tailed) above 0.05, namely, the *pretest of the* non-experimental class with a significant 1.44 $\geq$ 0.05, and for understanding the concept of experimental class *posttest* obtained significant 0.67 $\geq$ 0.05, the control class *posttest* is significant 0.103 $\geq$ 0,05. Homogeneous distributed data using the *Levene* test on the *SPSS 23.0* program which resulted in a sig value of 0.05.$\geq$ 0.05, namely the *pretest* obtained a significant

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value of 0.70 ≥ 0.05 and *posttest* obtained a significant 0.86 ≥ 0.05, both in the understanding of science concepts in the experimental class and the understanding of science concepts in the non-experimental class.

The data obtained are normally distributed and homogeneous. Furthermore, a simple linear regression test was carried out, to determine whether there was an effect of the model applied on the ability to understand the science concepts of students. According to Nuryadi (2013: 379) the simple linear regression formula:

$$Y = \alpha + Bx$$

Table 2. Recapitulation of simple linear regression analysis results

Constant		**R-value**	
A	B	R	R^2
81,4	0,25	0	0

Based on the table above, the regression equation is Y = 81.4 + 0.25. X to estimate the value of students' understanding of science concepts that are influenced by the *Integrative Learning* model method. The equation shows that:

a. The constant value (a) is 81.4; meaning that if using the Integrative model method *Learning* is 0 (zero), then the result of understanding the concept is positive, namely 81.4
b. The regression coefficient value of the *Integrative Learning* model method variable (b) is positive, namely 0.25; it means that if the value of the *Integrative Learning* model method (X) increases by 1 point, the result of understanding the concept (Y) will increase by 0.25.

Furthermore, obtained r count 0 with N = 20 for α = 0.05 obtained r table 0.444; so that r count> r table (0>0.444). Then R square = the magnitude of the termination coefficient (carrying capacity) of the independent variable (*Integrative Learning* model) in predicting the magnitude of the dependent variable (understanding of the science concept of students) of 0. So that based on the calculation of simple linear regression it can be concluded that there is an effect of *Integrative Learning* on increasing the understanding of science concepts of Class V Students of State Elementary School 40 Negeri Katon in the academic year 2023/2024. Recapitulation of data on the results of indicators of understanding the concept obtained in 2 classes that have indicators of understanding the concept. Below is the data from the recapitulation of concept understanding indicators:

Table 3. Data Recapitulation of *Pretest-Posttest* Results of concept understanding of Experimental and non-experimental classes through *Two tier*

	Class V Experiment	Class V non-experiment class
Pretest	50	47,679
Posttest	79	77,9

From the table above shows the average value of the *pretest-posttest* concept understanding test obtained by students in the experimental class after being treated, obtaining a *pretest* value of 50, *posttest* of 79, peaking compared to the control class after being treated, obtaining a *pretest* number of 47.67, *posttest* of 77.9 . This means that both the value on the *pretest-posttest of the* experimental class is greater than the *pretest-posttest* value of the non-experimental class. The ability to understand the concepts of experimental class students is higher than the ability to understand the science concepts of non-experimental classes.

In the research results that have been obtained by conducting a *pretest-posttest of* students which aims to see the level of ability to understand science concepts, with temperature material and its changes with *Integrative Learning learning* with the model used by non-experimental classes. Then seen from the data on the results of the concept understanding test criteria for experimental class 1 and experimental class 2 as follows:

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Table 4. *Posttest* results of concept understanding test criteria for experimental and non-experimental classes

Class	High	Medium	Low
Experiment	9	5	0
Non-experimental	8	6	0

Based on the table above, it is found that students who get *Integrative Learning* (experimental class) and non-experimental classes with high concept understanding are 9 and a medium level of 5 with low concept understanding of 0. While in the non-experimental class with high concept understanding of 8, medium of 6 and low of 0. The results of these data show that the level of concept understanding is higher in the experimental class compared to the non-experimental class.

Discussion

Based on research conducted at SDN 40 Negeri Katon, which aims to determine the effect of *Integrative Learning* on increasing the understanding of science concepts of fifth grade students of SDN 40 Negeri Katon with the material of Temperature and Its Changes. This research was conducted in experimental class V A and non-experimental class V B using the *Quasi Experiment* method and the *"nonequivalent control-group design" design.* Researchers took a sample of 20 experimental classes and 20 experimental classes with a total population of 200 students. In each class, learning materials are given using different learning models, namely for experimental classes applying *Integrative Learning* and non-experimental classes with the learning used in their schools.

The material presented is Temperature and its changes at the first meeting, of course the researcher introduces himself, then gives an explanation to the students so that during the course of the research process the students can follow it well, obey the rules given so that the research process gets good results too, after that proceed with the learning process. The application of experimental classes with *Integrative Learning* emphasizes integrating the knowledge gained and applied to real life. This research was carried out with 3x face-to-face with 2 hours of meeting at each meeting.

In the first stage (*Informed Exploration*) the initial knowledge of students in the material Temperature and its changes provide questions that are related to the ongoing lesson. Provide an overview of everyday life related to the learning process with the material that takes place. Then students are directed by educators to make learning groups of at least 5 people, Educators provide several questions to stimulate the curiosity of students, about the topics that will be discussed on the theme. Do you think heat can move? Then students answer "**because** there is a transfer of heat energy to achieve temperature equilibrium, through conduction, convection and radiation. Then the educator displays slides, pictures or videos about Theme 6: Heat and Its Transfer, Subtheme 3: The effect of heat on life, learning 1. Such as displaying a slide image of someone who is cooking water on the stove and drying clothes by linking examples in everyday life can help students understand the concepts they have learned.

The second phase (*Enactment*) in this phase students are to read the reading text entitled "Conductor and Insulator Materials". And are allowed to underline the important information they find in the reading. Then the Educator assigns students to make observations and pay attention to materials that can conduct heat (conductors) and inhibit heat (insulators). In the third phase of *Evaluation Local Impact* after making observations in the printed book, the Educator asks to answer the summary of information about how the iron works with their own sentences. Then the Educator directs students to write the results of their answers in the notebook. After that the Educator asks to analyze the questions on page 74.

During this activity, students are given directions on how to fill in the questions in the book which contains examples in everyday life with their groups, then record the results then group representatives present the results of the discussion.

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In the fourth phase of *Evaluation Broder Impact,* educators ask students to find examples in everyday life about Temperature and its changes. For groups that do it right, they can put stickers on the board provided. The score analysis of each indicator of understanding the concept is as follows:

1. Translator

   In the posttest presentation, the indicators of understanding the concept of the translator can be seen in table 17. Understanding the concept on the translator indicator can be seen from the answers of students no. 2, and 3, (the purpose of the thermos wall coated with silver), 8, and 14 (objects or tools that produce or conduct heat well). One of the questions in the concept of temperature and its changes with indicators of questions that change and illustrate.

   Based on the analysis of concept understanding above on the indicator of the question determining the thermos wall is coated with silver which aims to prevent heat transfer by ... students answer c. radiation with the reason for the answer, namely radiation, which is the transfer of heat without going through an intermediary substance. Because students answer correctly and the reasons they answer are correct so students are able to summarize the information in the problem, the translator indicator is mastered.

2. Interpretation

   In this indicator, students can understand science concepts characterized by diagrams, graphs, or pictures. From the results of the analysis of understanding the concept of interpretation of answers to understanding the concept with interpretation indicators and question indicators, namely pairing the correct answer about the correct name of what objects are made of. And the answers are 1 and 2 with the reason for the answer that the glass water thermos functions to keep the water hot. From the theory in the thematic book theme 6 heat and its transfer is the function of the glass in the thermos to keep the thermos hot according to Prihanita and Momon (2018: 79). So it can be concluded that students understand the concept of the function of glass in a water thermos.

3. Extrapolation

   Found in questions no. 1, 4, 5, 6, 10 and 13. Learners can infer from something that is already known, meaning that students understand this extrapolation indicator, for example calculating, determining etc.

In the analysis of understanding of science concepts that students understand the understanding of concepts with extrapolation indicators seen from the pattern of answers that are able to provide examples in everyday life of radiation heat transfer. The *Integrative Learning* model helps learners to integrate knowledge into applications in everyday life. So that students are able to understand concepts with events in everyday life. This is in accordance with previously conducted research that the *Integrative Learning learning* model can improve students' concept understanding according to Lia Yulianti (2016: 43-73).

The learning model used at school (*discovery learning)* consists of 4 stages. The first stage *Problem statement* Educators divide students into 5 groups, then educators invite students in the school environment to find the right source. Do you think heat can move? "Students answer because there is a transfer of heat energy to achieve temperature equilibrium, through conduction, convection and radiation". The second stage (Data *collection)* Educators tell students to write down the findings in the field.
The third stage *(Data processing),* Educators tell students to analyze, and classify their findings according to the problem. Educators tell students to re-examine the results obtained while in the school environment. The fourth stage *(Verification), the* Educator tells students to match the results of their findings with the hypotheses made, consulting the results with the teacher. Then the Educator directs each learner to share their findings with other groups to provide input.

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The analysis of each indicator of understanding the concept for the non-experimental class is as follows:

1. Translator

   Understanding the concept on the translator indicator is seen from the answers of students no. 2, and 3, (the purpose of the thermos wall coated with silver), 8, and 14 (objects or tools that produce or conduct heat well). One of the questions in the concept of temperature and its changes with indicators of questions that change and illustrate.

2. Interpretation

   In non-experimental classes, students are able to interpret a problem presented because students get a high score on each problem.

3. Extrapolation

   Found in questions no. 1, 4, 5, 6, 10 and 13. Learners can infer from something that is already known, meaning that learners understand this extrapolation indicator, for example calculating, determining etc.

Based on data analysis on each of the implementation of *Integrative Learning* with the learning model used in the school with an understanding of the concept, it obtained a different percentage score on *Integrative Learning, the* highest percentage was obtained on the interpretation indicator of 73.75%. And in the learning model used at school the highest indicator of each student's answer is located on the interpretation indicator of 72.50%.

The test was given to the experimental class and the non-experimental class in the form of a *pretest-posttest. The* questions have been tested first using validity, reliability, difficulty level, exemption, and differentiation tests. The questions given during the trial were 20 questions (14 valid and 6 invalid). *Pretest* as an assessment of students' initial expertise, both classes have a low average value of concept understanding, namely the experimental class of 50 and the control class of 47.68%. After implementing *Integrative Learning* in the experimental class, the researcher gave a *posttest* as the final ability. Then the increase was seen after being treated. The experimental class was 79 and the control class was 77.9. The success of each indicator of concept understanding is inseparable from learning activities in the classroom. The first indicator is the interpreter obtained percentage results in the experimental class of 61% with a "high" category, while in the non-experimental class with a percentage of 63% with a "high" category. The second indicator, namely interpretation, obtained percentage results in the experimental class of 73.75% in the "High" category, while in the non-experimental class obtained results with a percentage of 72.50% in the "high" category. The third indicator, namely extrapolation, obtained results in the experimental class of 70% with a "high" category, while in the non-experimental class obtained results with a percentage of 66.67% with a "high" category. This means that in terms of understanding the concept of science, the experimental class is higher than the non-experimental class seen from the average of the three indicators.

This condition shows that the expertise of understanding the science concepts of students for the experimental class is influential than the non-experimental class. This same response is also reinforced from research conducted by Lia Yulianti that *Integrative Learning* can increase the understanding of concepts, especially science students, because the application of this model expands knowledge to group members to share answers to solved cases by discussing with each other between group neighbors. This allows the transmission of information between learners, so they are more active in the classroom. The research activities went well and smoothly with the application of *Integrative Learning* in the experimental class and the learning model applied at school *(discovery learning)* in the non-experimental class. This can be seen from the observation sheet of the implementation of the learning model carried out during the learning process.

In this study the results of understanding the concept seen from all knowledge which means cognition from cognition (knowledge from the realm of knowledge). This means that the realm of knowledge consists

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of C2, C3, C4, C5 and C6 so that understanding of the concept includes C2 because understanding is included in the C2 cognitive domain. Data analysis shows the *n-gain* value in the experimental class is 0.47 and in the non-experimental class is 0.46, which means that the average in the experimental class is categorized as increasing compared to the average in the non-experimental class. Normality test using *Kolmogorov-Smirnov, the* experimental class obtained a *pretest* value of 2.00 and a *posttest* value with a significant 0.71, while the non-experimental class obtained a *pretest* & *posttest* value of 0.53. By looking at the normality of *posttest* understanding, the sig value is $\geq$ 0.05 or 0.71 $\geq$ 0.05, normally distributed.

Furthermore, the results of the homogeneity test with the *Levene* test obtained the ability to understand the science concepts of the experimental class *pretest* 0.70 and *posttest* 0.86, because the significance value> 0.05, then the data varies homogeneously with sig. $\geq$0.05 or 0.86 $\geq$0,05. After that, the hypothesis was tested, the t-test results showed that the sig value. (2 tailed) of 0.005 <0.05 then H_0 rejected and H_a accepted, it can be concluded that there is an effect of *Integrative Learning* on increasing the understanding of science concepts of Class V Students of State Elementary School 40 Negeri Katon.

The results of this study are in line with the findings of Hastuti and Marsigit from Yogyakarta State University, who developed thematic-integrative teaching materials based on the scientific approach. Their study showed that the use of integrative learning can increase students' confidence in learning, supporting the results of this study that integrative learning models are effective in improving students' overall concept understanding. Furthermore, Permadi, Sudarmin, and Mulyono's research from Semarang State University used the SETS (Science, Environment, Technology, and Society) Guided Discovery model and found a significant increase in students' concept understanding with a concept mastery percentage of 66.67%. This is in line with the results of this study, where integrative learning also resulted in an increase in concept understanding seen from the pretest and posttest scores.

Suryani, Rusilowati, and Wardono emphasized the importance of cognitive conflict learning in improving students' concept understanding through two-level diagnostic tests. This suggests that innovative learning strategies, including integrative learning, can support deeper concept understanding and reduce misconceptions, as seen in this study. Handayani in her research on integrative problem-based learning modules also found higher results in affective and psychomotor aspects in the experimental class compared to the control class. This supports this study, where the implementation of integrative learning has a positive impact on students' overall learning outcomes.

This research also supports the findings of Sri, Firman, and Efendi from Padang State University who showed that a two-level diagnostic test can be used to detect misconceptions and improve the teaching-learning process. The use of similar diagnostic tools in this study confirms the importance of identifying and addressing misconceptions in science learning. Based on the results of this study, it can be concluded that the integrative learning model has a significant positive effect on improving students' understanding of science concepts. The integration of acquired knowledge and its application in real life helps students understand concepts better and reduce misconceptions. Thus, integrative learning should be considered as an effective learning model to be applied in basic education.

CONCLUSIONS AND RECOMMENDATION

The conclusion of the study states that there is an effect of integrative learning on improving the understanding of science concepts of Grade V Students of State Elementary School 40 Negeri Katon. This can be seen from the average value of N-gain in the experimental class 0.47 and non-experimental class 0.46. In this case, it is also proven from the test to determine the effect of the model on the understanding of science concepts by using a simple linear regression test which shows that there is an effect of integrative learning on increasing the understanding of science concepts of Grade V Students of State Elementary School 40 Negeri Katon.

Based on the findings of this study, it is recommended that students actively engage in the learning process by asking more questions and participating actively in answering questions posed by the teacher, as

this will help train their conceptual understanding. Teachers are encouraged to motivate students to fully engage in learning activities to achieve optimal outcomes. School administrations are also advised to enhance the quality of education by providing adequate facilities and improving the learning process. For future researchers, this study can serve as a reference for further research, particularly for exploring other learning models or combining multiple models to more effectively improve science concept comprehension at the elementary level.

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