Implementation of Experiential Learning Model to Improve Science Process Skills

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Abstract: Data collection in this study aims to describe the effect of the experiential learning model on improving student's science process skills. The factor that causes low science process skills is that teachers. The experiential learning model is a learning model that implements a direct student learning process. This study uses a quantitative approach with experimental methods. The type of research research is a one-group pre-test and post-test design. The sample in this study was using a saturated sampling of 22 students. The research instrument is science process skills (KPS) test questions oriented to description and multiple choice questions. Data were analyzed descriptively quantitatively by normality test for normal data testing and normalized gain-score test to see the improvement of students' KPS. In addition, it is known how much the KPS increase using the N-Gain Test is 0.51, with a moderate category included in the normalized gain criteria of $0.3 \geq g \leq 0.7$. Based on the results of the research data obtained, the average score on the pre-test was 59.09, while the average score on the post-test showed an increase to 80. This research proves that learning using the Experiential Learning model can make students understand the material in depth, which is taught through the search process carried out by students.

Abstrak: Pengumpulan data dalam penelitian ini bertujuan untuk mendeskripsikan pengaruh model *experiential learning* terhadap peningkatan keterampilan proses sains siswa. Faktor yang menyebabkan rendahnya keterampilan proses sains yaitu seringnya pengajar menerapkan model pembelajaran yang berpusat pada guru. Model pembelajaran *experential learning* adalah model pembelajaran yang mengimplementasikan proses belajar siswa secara langsung. Penelitian ini menggunakan pendekatan kuantitatif dengan metode eksperimen, jenis penelitian penelitian *one group pre-test* dan *post test design*. Sampel pada penelitian ini yaitu menggunakan sampling jenuh 22 siswa. Instrumen penelitian berupa soal tes keterampilan proses sains (KPS) yang berorientasikan soal uraian dan pilihan ganda. Selain itu diketahui seberapa besar peningkatan KPS menggunakan Uji N-Gain 0,51 dengan kategori sedang yang termasuk dalam kriteria normalized gain $0,3 \geq g \leq 0,7$. %. Berdasarkan hasil data penelitian yang diperoleh rata-rata nilai pada pretest menunjukkan hasil 59.09 sedangkan nilai rata-rata pada posttest menunjukkan kenaikan menjadi 80. Penelitian ini membuktikan bahwa pembelajaran menggunakan model *Experential Learning* dapat menjadikan siswa memahami materi secara mendalam yang diajarkan melalui proses pencarian yang dilakukan oleh siswa.

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A. Introduction

Natural Science (IPA) is a science that studies nature or focuses on the processes that exist in it. The nature of science is a science that focuses on natural phenomena using the scientific method to solve scientific problems that are happening (Kristyowati & Purwanto, 2019). As a scientific process, science is defined as an activity that refines knowledge related to nature and discovers new knowledge. Daily life will not be separated from activities related to science. Therefore, science learning has a close relationship with real experience. Thus, science learning is beneficial for students in studying themselves and the state of the surrounding environment. It can also help develop the knowledge gained for the welfare of humans around them. In science learning, students are guided to carry out the discovery process because it can stimulate students to be actively involved. So, science learning is essential for students because it is helpful for themselves and their environment and is valid for increasing the knowledge gained for the people around them (Kastawaningtyas & Martini, 2018). IPA berfokus pada pemahaman alam secara sistematis, tujuan pendidikan IPA di SD antaralain untuk mengembangkan keyakin siswa terhadap kebesara Tuhan Yang Maha Esa melalui apresiasi terhadap keberadaan, keindahan, dan keteraturan alam ciptaan Tuhan dan pemahaman konsep ilmiah yang diterapkan dalam kehidupan sehari-hari (Safitri & Setiyawati, 2023).

The role of the teacher in the learning process is as a director and guide, while those who carry out the process are the students themselves. The process's mastery requires scientific skills covered in Science Process Skills (KPS) (Lusidawaty et al., 2020). In the 2013 curriculum on science learning in elementary school, students can find and carry out solutions and problems faced in science learning through this process; with the scientific process, students can obtain science process skills (Kusumawati & Adawiyah, 2016). In order to achieve the learning objectives, it can be seen from KPS during the learning process, which is supported by student learning outcomes (Prasasti, 2018). The purpose of KPS in science learning is essential because it can direct students to achieve learning objectives by providing direct experience through scientific investigation. In addition, implementing science learning into KPS can expand knowledge and learning with the nature of science. KPS is an inseparable part of the science learning process (Hamadi, 2018). KPS is a directed scientific skill used to discover a principle to develop a pre-existing theory or refute a discovery (Prasasti, 2018). KPS is very important for students because it can provide a more meaningful learning experience by developing various attitudes, knowledge, and skills. So that it can teach students to describe events, ask questions, build explanations, test students against scientific knowledge, and implement their thoughts to others (Nugraha et al., 2017). KPS is a skill possessed by scientists to research natural phenomena. However, for elementary school-age children, cognitive abilities cannot be equated with scientists' cognitive. Therefore, students are taught in a more straightforward form adapted to the cognitive stage of elementary school-age children (Susilowati, 2019). This is supported by Nur (2011), who states that there are many attitudes in KPS, namely observation, referencing, prediction, classifying, hypothesis development, communicating, drawing

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conclusions, calculating, designing experiments, asking questions, modeling, controlling variables, formulating operational definitions, interpreting data, measuring, making data tables, making bar graphs, making line graphs, making circle graphs (Asrial et al., 2022). From the explanation of Nur's theory (Nur, 2011), this research uses KPS in the developmental stages of elementary school-age children: observation, prediction, classification, experimental design, asking questions, and hypothesis development. The six stages of KPS were used as indicators in the research.

Researcher Sudiarta (Taib et al., 2020) said that the low mastery of KPS is due to dominant learning by memorizing rather than finding or verifying concepts. Researcher Arifullah (Filujeng et al., 2022) said the lack of practicum activities resulted in low student KPS. Based on the results of preliminary observations made by researchers, they obtained some information that students' KPS in science lessons at SD Negeri Jogosatru needed to be maximized. Teachers often apply conventional learning models in which they prioritize the lecture method, as well as giving assignments and questions and answers between teachers and students in learning, causing students to lack innovation or concept discovery so that the knowledge gained by students becomes less. This statement stems from the low learning innovation the Jogosatru State Elementary School teachers carried out in the learning process. This condition is one of the factors for the low KPS of students. Based on data evidence from my observations, it states that the level of KPS ability at SD Negeri Jogosatru is arguably low, reaching a percentage below 70% of students who have not been able to predict, ask questions, plan experiments, hypothesize, observe, and classify. Therefore, students need to be more optimal in understanding the material.

Based on the above problems, what the researchers did in this study was to apply a learning model strategy to provide an increase in KPS. In the process of improving students' KPS, there needs to be a learning model used by the teacher. Therefore, the experiential learning model is needed because it is considered relevant to overcome these problems. The experiential learning model is a learning model that implements the student learning process directly. The factor that can influence students in improving KPS is the learning model used by the teacher. Permatasari researchers (Novianti et al., 2019) said experiential learning can also improve students' social interaction because students will concretely experience the learning process. The advantage of the experiential learning model is that it can provide an easy understanding between practice and theory and help students realize their abilities. Experiential learning focuses more on experience and applying the experience to a new environment. So, that experience is the key to learning itself. Kolb researchers (Barida, 2018), the stages of experiential learning are concrete experience, reflective observation, abstract conceptualization, and active experimentation. The experience stage starts with students being involved in an experience, and then individuals can reflect on the experience. Students can conclude what happened and then observe. This can be brought into future actions when students try new behaviors in different places. Then, in the end, students will have new experiences from their experiments (Ridyah & Sriyati, 2019)

So, in connection with how to improve students' KPS, this study aims to describe the

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effect of the experiential learning model on improving students' KPS. The experiential learning model does not require students to read a material or concept, but students are active and independent to gain more experience (Zannatunna'imah et al., 2021). The experiential learning model aims to train students' KPS by inviting students to see how things happen in everyday life. Then, students are invited to conduct simple research to understand the actual events. In the final stage, together, students are invited to conclude. What students do in the final stage is one of the understandings that can be achieved by students (Kastawaningtyas & Martini, 2018).

B. Method

This research is a type of quantitative research. This type of research uses pre-experimental research with a one-group pre-test and post-test design. This research was conducted in one group only without a comparison group. The location of this research was carried out at SD Negeri Jogosatru. This study's population was fifth-grade students of SD Negeri Jogosatru. The technique for sampling in this study is to use a saturated sampling of 22 students, where the population is used as a sample.

The instrument used in this research is the KPS test. The research instrument is KPS test questions oriented towards descriptions and multiple choice questions developed from several indicators. The material researchers use heat and its transfer because it can provide phenomena we often encounter in everyday life and bring students closer to real problems. Expert validators assessed the validation process related to the KPS test assessment instrument. The assessment given by the validator is obtained from the validation sheet. The validity of the questions can be measured using the construct validity test formula. Then, the reliability test was carried out by experts using the Percentage of Agreement (PA). The instrument is reliable if it gets a Percentage of Agreement (PA) value ≥ 70%.

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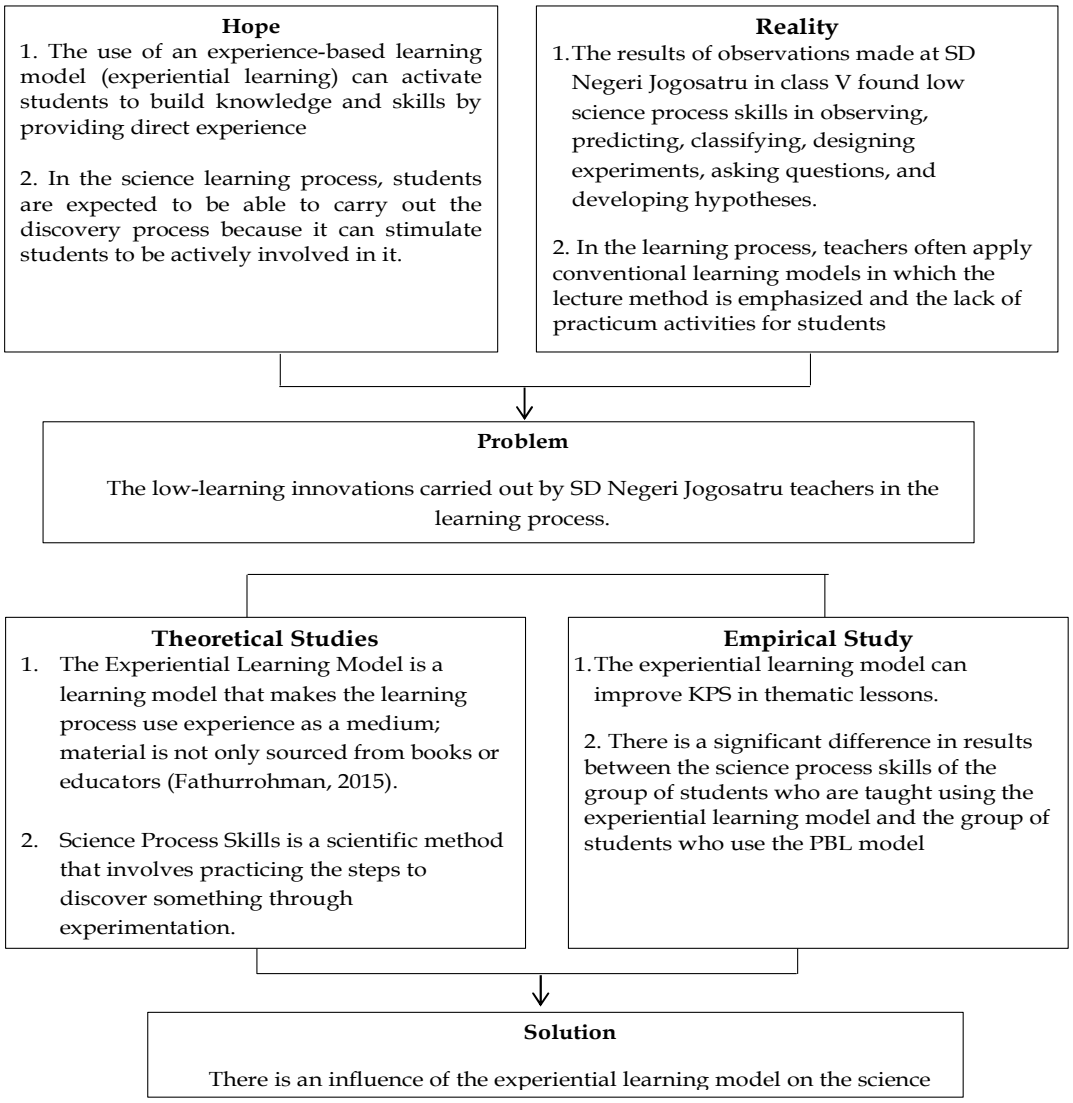

Figure 1. Research Flow

The data collection technique used by researchers is using the KPS test. The test is given before treatment (pre-test) and after treatment (post-test) to investigate how successful the model used by researchers in this study was. In this study, students were invited to participate in an experiment about heat and its transfer directly to ensure that the material obtained was more accessible to accept and understand. In this study, researchers used students' KPS, which were reasonably low, namely predicting, asking questions, planning experiments, hypothesizing, observing, and classifying. The data obtained were then analyzed descriptively quantitatively to determine the success of students' KPS and how KPS was achieved. The pre-test and post-test results were tested for normality to test normal data. Normalized gain-score test to see the improvement of students' KPS. To see how the criteria for improving students' KPS, a normalized gain analysis <g> was carried out (Hayati et al., 2022) with the formula:

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$$<g> = \frac{\%(Sf) - \%(Si)}{100 - \%(Si)}$$

Description:
<g> = normalized gain score
Si = pre-test score
Sf = post-test score

The scores obtained can be categorized using the score interpretation criteria in the following table:

Table 1. N-Gain Categories

N-Gain Value	Category
g > 0,7	High
0,3 ≥ g ≤ 0,7	Medium
g < 0,3	Low

C. Result and Discussion

Result

This research was conducted using the Experiential Learning model, which aims to describe the effect of the experiential learning model on improving the KPS of fifth-grade students of SDN Jogosatru on the material "Heat Transfer". Data collection in this study used KPS test instruments totaling ten questions. This study used a quantitative research design and experimental Design (One Group Pre-test and Post-test). Researchers took the entire population as a sample, namely class V, which comprised 22 students by giving a pre-test before and post-test after treatment. Researchers made ten questions in essays and multiple-choice choices containing nine indicators of science process skills. The results of the pre-test values can be seen in Figure 2.

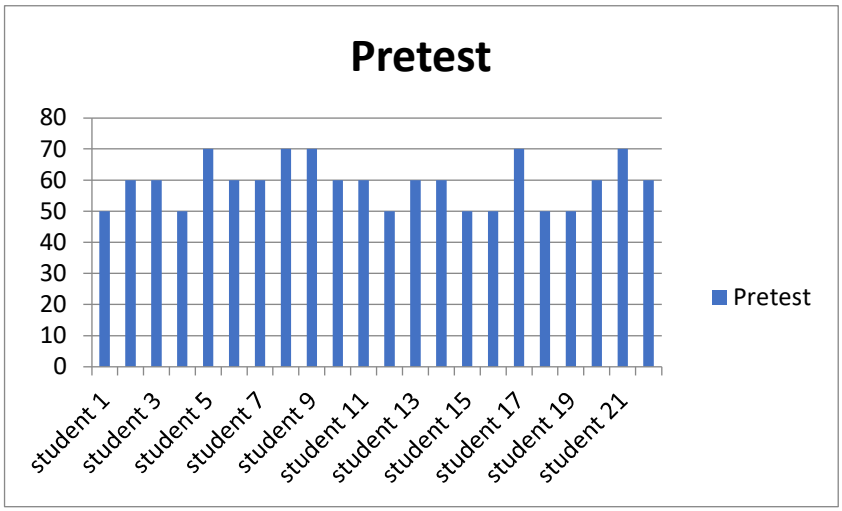

Figure 2. Graph of Pre-test Science Process Ability Testing Results

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Figure 2 shows that the pre-test scores indicate different student ability levels before treatment. The research used science subjects with as many as ten items of multiple-choice questions and descriptions given to students. This research data consists of pre-test scores taken from scores before treatment. The lowest pre-test score got a result of 50, and the highest score got a result of 70, totaling 1,300, with an average of 59.09.

The KPS question instrument that has been declared reliable is used by researchers to test the effect of using the Experiential Learning model on students at SDN Kebakalan Porong grade 5, totaling 22 students. The pre-test was conducted by researchers who acted as teachers by applying the experiential learning model. The teacher began the activity with greetings, took attendance, conveyed the learning objectives, explained the material being studied, divided the students into several groups, provided tools and materials to conduct heat transfer experiments, then distributed LKPD, gave time to students to discuss, present the results of their discussions, then the teacher gave an evaluation and conducted a question and answer session.

The post-test conducted by researchers applying the experiential learning model by following the lesson plan by following the stages of the experiential learning model with the teacher providing an experience that students do not yet have an awareness of the nature of an experience and students only feel the experience, cannot yet explain the reasons why events can occur, the teacher provides opportunities for students to make active observations of the events they experience by looking for answers by reflecting on what happens around them, the teacher provides opportunities for students to make observations made by formulating the results of observations, the teacher invites to do things with others and take action based on events. Students can apply the concepts or rules learned in the real world.

Figure 3. The Teacher Prepares the Materials

Figure 4. Teacher's Practicum Explanation

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Figure 5. Heat Transfer Conduction

Figure 6. Convection Heat Transfer

Figure 7. Radiation Heat Transfer

Figure 8. Working on Evaluation Questions

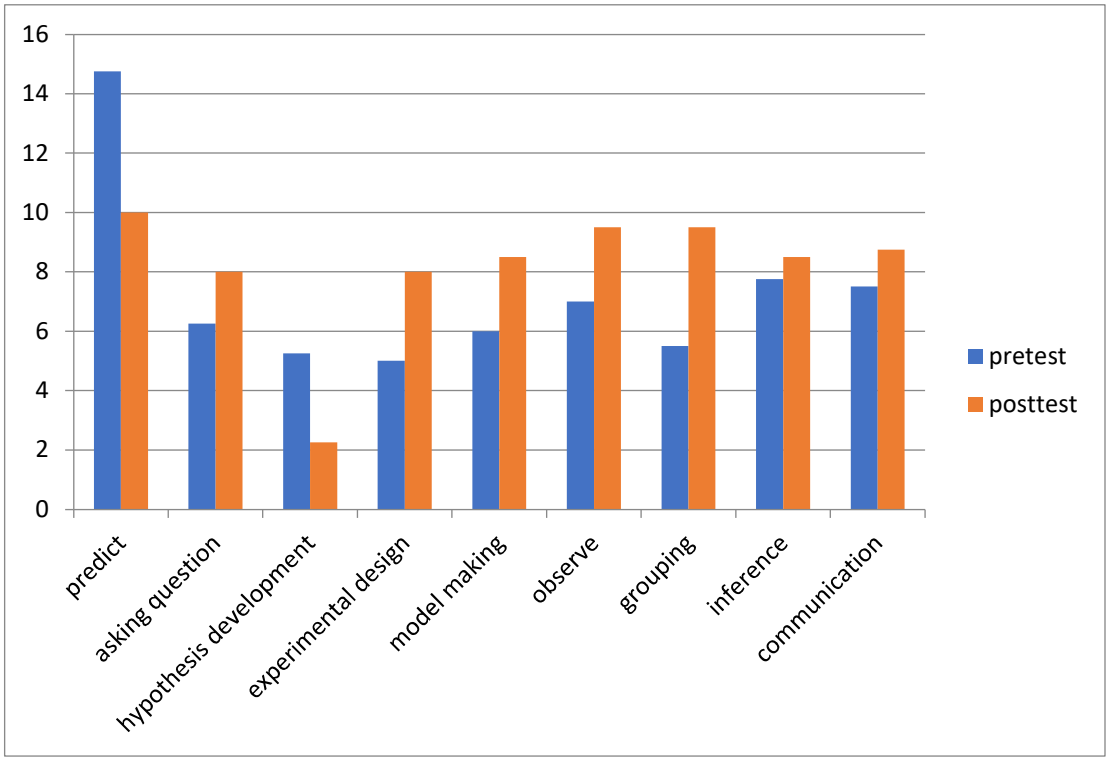

Figure 9. Graph of Pre-Test Post-Test Results on Science Process Skills Indicators

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Based on the results of Figure 9 above, before the Experiential Learning model was applied, some students answered incorrectly, namely on the Prediction indicator (14.75), Asking Questions (6.25), Hypothesis Development (5.25), Experiment Design (5), model Making (6), Observing (7), Classifying (5.5), Inferring (7.75), Communicating (7.5). After the test using the Experiential Learning model, several indicators have increased with an average value of prediction (10), Asking Questions (8), Hypothesis Development (2.25), Experiment Design (8), model Making (8.5), Observing (9.5), Classifying (9.5), Inferring (8.5), Communicating (8.75). However, two indicators are still classified as low: prediction and hypothesis development. These results show differences before and after treatment in the results obtained by students. Based on the research conducted with the application of the experiential learning model, the application of this method can influence increasing students' KPS, so it can be concluded that the experiential learning model is effectively used during learning activities in the classroom.

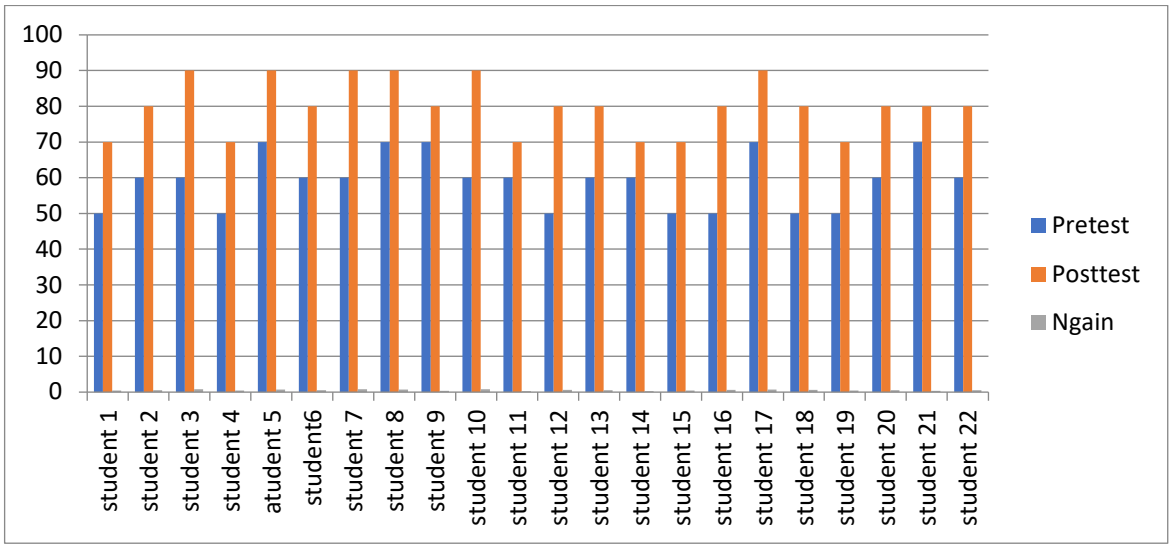

Figure 10. Graph of Pre-test Post-test N-Gain Results on Science Process Skills Indicators

Based on the results of Figure 3 above, in the post-test activity, several students scored 70 and above, as many as 16 students, while students who scored 70 were six students with a total of 1,760 with an average of 80. Thus, using the experiential learning model can improve students' KPS. The results of the N-Gain calculation obtained a result of 0.51 with a moderate category included in the normalized gain criteria of $0.3 \geq g \leq 0.7$. So, there is a difference between the pre-test and post-test scores before and after the treatment.

Discussion

Science Process Skills (SCS) are higher-order thinking skills. This skill is essential for students to have because high thinking skills are activities that involve students' cognitive in the learning process. KPS has a vital role in helping students find concepts and becomes an essential step in the learning process, especially in developing the concept of science material. This skill is closely related to KPS because it involves students in solving problems

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to develop their knowledge (Santiawati et al., 2022). By applying KPS, students can find concepts and facts in learning through authentic experiences. Understanding science is not only knowing the facts but also understanding how to collect facts to interpret. In the Science Process Skills, this research uses KPS by the developmental stages of elementary school children, namely observation, prediction, classification, experimental design, asking questions, and hypothesis development.

Of the 9 KPS indicators studied after using the Experiential Learning model, it can increase students' science process skills because students listen to the material seriously and pay attention, actively asking questions and answers. This condition proves that learning using the Experiential Learning model can make students understand the material deeply taught through the search process carried out by students. The results of research conducted by Ageng Kastawaningtias titled "Improving Students' Science Process Skills Through Experiential Learning Models for Elementary School Students" revealed that the experiential learning model improved KPS (Putra & Pebriana, 2022). However, two indicators still need to be classified as low: prediction and hypothesis development. This lacks student optimization, and students seem less active and interactive when the researcher explains the material. Students tend to need help understanding the lesson and connecting one concept to another, or students are unable to relate learning concepts to everyday life. However, some students have improved. This happens because students have started to be active in the learning process, dare to communicate the results of their observations, and pay close attention during the learning process.

The Experiential Learning model is a learning model that implements a direct student learning process. Using the Experiential Learning Model, students search for concepts through experiments and are trained to conduct discussions in groups and present in front of the class. In the learning process, this model puts students in a deep search process to understand the material being taught. Students will get more substantial concepts and more than temporary memorization. The Experiential Learning model aims to allow students to experience the acquisition of a concept, and students can develop scientific concepts such as cooperation, curiosity, confidence, and other scientific attitudes (Putra & Pebriana, 2022). Majid researchers (Ridyah & Sriyati, 2019) that the Experiential Learning model is a model that provides students to construct skills, knowledge, and attitude values.

The learning process using the Experiential Learning model can improve students' KPS because, using this model, students can understand the material in depth that is taught through the search process carried out by students. After being given the model, students learn material not only from books but experience from themselves can be used as a learning source. The Experiential Learning model is very influential on student KPS to help find concepts, and this is an essential step in the learning process, especially in finding the concept of science material. With science learning activities, students get real experiences, and this learning is expected so that students can understand natural phenomena that occur around them. Using Experiential Learning models, students are given knowledge and insights about concepts and invited to build skills through actual assignments. This is in line

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with Fathurrohman's opinion that the Experiential Learning Model is a model that can make the learning process use students' actual experiences. Therefore, using the Experiential Learning model can achieve better student post-test results (Hajjah et al., 2022).

D. Conclusion

This study can conclude that using the Experiential Learning model on the material of heat and its transfer affects the science process skills of class V SD Negeri Jogosatru. This was obtained based on the normality test and normalized gain-score test. The normalized gain-score results obtained an N-Gain score of 0.51 with a moderate category of $0.3 \geq g \leq 0.7$ in the normalized gain criteria. In addition, it can be seen how influential the results of the normality test are to see the results of the pre-test and post-test with an average value of 80. This condition proves that learning using the Experiential Learning model can make students understand the material in depth through the search process carried out by students.

The use of the Experiential Learning model can improve science process skills. By applying this model, students see events in everyday life, and then they are invited to conduct simple research to understand the actual events. Teachers, as facilitators in the learning process, are responsible for choosing learning methods wisely. The choice of method must be made according to the open material in the book and the students themselves. Learning will be delightful if it is planned well (Fatmawati & Rezania, 2024)

In this study, being known is using the Experiential Learning model to improve science process skills. Similar research needs to be done to compare more effective learning models. The researcher hopes that further research can strengthen and develop the study results to determine the effectiveness of the Experiential Learning model in improving student science processes in several schools.

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