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THE EFFECT OF LEARNING CYCLE 5 E LEARNING MODEL IMPLEMENTATION ON FIFTH GRADE STUDENTS' SCIENCE PROCESS SKILLS

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Abstract
This study aims to describe the effectt of applying the Learning cycle 5 E learning model on the science process skills of students on the material of the respiratory system in humans. The research design used is a Quasi Experimental type experiment with a nonequivalent control group design. The population in this study were all fifth grade students of MIN 2 Pontianak, using purposive sampling technique, based on recommendations by the madrasah, namely class 5 C (control) and 5 E (experimental) each totaling 38 students.. Based on the results, it can be proven that: 1) Science process skills in the control class obtained a good category on the pretest, and on the posttest obtained a good category. 2) Science process skills in the experimental class obtained a good category on the pretest, and on of the posttest obtained a good category 3) Based on the results of hypothesis testing, it can be concluded that there is a difference between the control class and the experimental class with the effect size test results of 0.618, meaning that the application of the 5 E learning cycle model in the experimental class has a moderate influence on the science process skills of students.
Keywords: *Science, Science Process Skills, Learning Cycle 5 E.*

Abstrak
Keterampilan proses sains merupakan keterampilan yang dibutuhkan untuk mengembangkan dan menerapkan konsep-konsep, prinsip-prinsip, hukum-hukum dan teori sains secara alami. Hal tersebut berguna dalam membekali peserta didik untuk menggunakan pengetahuan yang dimilikinya untuk menyelesaikan berbagai persoalan dikehidupan sehari-hari. Penelitian ini bertujuan untuk mendeskripsikan pengaruh penerapan model pembelajaran Learning cycle 5 E terhadap keterampilan proses sains siswa pada materi sistem pernapasan pada manusia. Desain penelitian yang digunakan adalah eksperimen jenis Quasi Eksperimental dengan rancangan nonequivalent control group design. Populasi dalam penelitian ini adalah seluruh siswa kelas V MIN 2 Pontianak, dengan menggunakan teknik purposive sampling, berdasarkan rekomendasi oleh pihak madrasah, yaitu kelas 5 C (kontrol) dan 5 E (eksperimen) masing masing berjumlah 38 peserta didik. Teknik pengumpulan data menggunakan tes dan nontes, sedangkan alat pengumpulan data menggunakan soal pilihan ganda, lembar observasi dan dokumentasi. Selanjutnya teknik analisa data menggunakan uji statistik deskriptif dan inferensial. Berdasarkan hasil penelitian, dapat dibuktikan bahwa: 1) Keterampilan proses sains pada kelas kontrol memperoleh kategori baik pada pretest, dan pada posttest memperoleh kategori baik. 2) Keterampilan proses sains pada kelas eksperimen memperoleh kategori baik pada pretest, dan pada posttest memperoleh kategori baik. 3) Berdasarkan hasil uji hipotesis dapat disimpulkan bahwa terdapat perbedaan antara kelas kontrol dan kelas eksperimen dengan hasil uji effect size sebesar 0,618, artinya penerapan model siklus belajar 5 E pada kelas eksperimen memberikan pengaruh yang sedang terhadap keterampilan proses sains peserta didik.
Kata Kunci: Ilmu Pengetahuan Alam, Keterampilan Proses Sains, Learning Cycle 5 E.

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Pendahuluan

Science process skills are important abilities needed to develop and use scientific concepts, principles and theories. With these skills, learners can discover facts, build concepts, and apply scientific attitudes in learning. Research (Annisa et al., 2023) shows that science process skills help learners develop natural abilities and find personal understanding of scientific concepts. This can optimize learners' critical and scientific thinking abilities, and help them to effectively address real-life problems (Rohmatun et al., 2024).

According to (Wahyuni dkk., 2024), applying the science process skills approach significantly improved students' understanding and performance in science subjects. This was evidenced by a significant increase in test scores after the intervention was implemented. This approach allows students to be actively involved in the learning process, where they not only passively receive knowledge but also develop critical and analytical thinking skills. By involving learners in scientific processes such as observation, experimentation, and data analysis, learners are better able to understand science concepts in depth and application. This approach also improves problem-solving and decision-making skills, which are important aspects of science education. Therefore, the development of science process skills among primary school students is essential to achieve learning objectives.

Research shows that many students in Indonesia still have low science literacy skills. One evidence of this low science literacy is the results of the PISA (Program for International Student Assessment) survey. Based on PISA data, Indonesian students' science literacy skills are still below the international average. In 2022, although Indonesia's science literacy ranking rose 5-6 positions compared to 2018, the science literacy score actually decreased. In 2018, Indonesia's science literacy score was 393, while the international average was 489 489 (OECD, 2019). In 2022, Indonesia's science literacy score dropped to 383, with an international average of 485 (OECD, 2023). From the data, it can be seen that Indonesia's science literacy score decreased by 13 points, which is almost parallel to the international average decrease of 12 points. This low science literacy certainly has an impact on students' science process skills, which are an important component in understanding and applying science concepts effectively.

The results of initial observations at MIN 2 Pontianak confirmed this problem. In science learning, teaching materials are still dominated by teachers, while students are only involved in reading and memorizing without being given the opportunity to develop concepts independently. Learners are only given practice questions or assignments from books provided by the school, causing teachers to focus more on the cognitive value of students. The assessment of science skills carried out by teachers is limited to group projects and presentations, which only assess the communication aspect, while other science process skills such as observation, measurement, classification, prediction, inference, and communication have not been taught thoroughly. These science process skills are very important for students to master so that they can think critically and understand science better. As stated by Prasasti (2018), science process skills play an important role in developing students' thinking ability. In addition, research shows that knowledge will last longer if students are actively involved in its development (Danianty & Sari, 2022). Thus, a more active and participatory learning approach is needed for students' science process skills. One of them is by applying the 5 E learning cycle learning model. 5 E learning cycle learning model has been proven to significantly improve learners' science process skills by promoting active engagement and structured learning. Research conducted by (Sari & Shalihah, 2023) shows that this model is effective in improving science process skills with an N-Gain score of 0.6131 in fifth grade students, which indicates moderate effectiveness. In addition,

research conducted by (Wahyuningsih & Budianti, 2023) highlighted that the 5E Learning Cycle Model facilitates students' active participation in the learning process, which in turn results in a significant improvement in learning outcomes

.Based on this explanation, the researcher felt interested in conducting a more in-depth study of science process skills which aims to measure and identify the science process skills of students without using the Learning Cycle 5 E learning model intervention in the control class and to find out the extent to which students' science process skills developed after the application of the Learning Cycle 5 E learning model in the experimental class. In addition, the purpose of this study is to describe and analyze the effect of the application of the Learning Cycle 5 E learning model on the science process skills of students on the material "Respiratory System in Humans" at MIN 2 Pontianak in the 2023/2024 school year. This research will evaluate how the Learning Cycle 5 E model, which consists of the stages of Engagement, Exploration, Explanation, Elaboration, and Evaluation, can improve or influence students' science process skills compared to conventional learning methods.

Research Method

To produce data in the results of the study, researchers used a type of quantitative research, using experimental methods. The research design used is a quasi-experimental type experiment with a nonequivalent control group design. There are two classes that have been selected, namely the treatment group (experimental) and the control group. The experimental group was treated using the Learning Cycle 5E model, while the control class did not receive treatment using the model in the classroom learning process.

To find out the development of students, pretest and posttest questions were given. This is in line with research conducted by Jasmidalis et al. (2020), questions on the pretest and posttest to measure the progress of knowledge from students. The independent variable (variable X) in this study is the learning cycle 5 E learning model, and the dependent variable (variable Y) in this study is students' science process skills.

This research was conducted in class V of MIN 2 Pontianak, which was carried out in November 2023 odd semester in the 2023/2024 school year. The population in this study were all fifth grade students at MIN 2 Pontianak. Sampling was carried out using purposive sampling technique, based on recommendations from the madrasah, where class 5C (control) amounted to 45 students and class 5E (experimental) amounted to 43 students and those present on the research day were 38 students in the control and experimental classes.

Data collection techniques using tests and non-tests. Test data collection is given in the form of multiple choice questions. Non-tests use observation, and documentation. Test data collection tools use science process skills questions as many as 15 questions and non-test data collection tools using observation sheets and documentation. The instrument used was a test in the form of multiple choice questions used in the pretest and posttest. Making test questions is based on aspects of science process skills which are translated into question indicators in the form of question grids. Before the pretest and posttest questions were used for data collection, an instrument validity test was conducted to evaluate the accuracy of the instrument. The assessment of expert test results 1 and 2 was calculated using the Gregory formula, and the results of the experts were tabulated. The validity test results showed that the science process skills question obtained a coefficient of 1, with very high criteria and was considered valid overall.

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The hypothesis proposed in this study is that "The application of the Learning Cycle 5 E model has an influence on Science Process Skills (KPS) of Natural Science (IPA) class V at MIN 2 Pontianak" $\boldsymbol{H0}$: There is no effect of the application of the Learning Cycle 5 E model on the science process skills of grade V students on the material of the human respiratory system at MIN 2 Pontianak $\boldsymbol{Ha}$: There is an effect of the application of the Learning Cycle 5 E model on the science process skills of grade V students on the material of the human respiratory system at MIN 2 Pontianak.The results of the data analysis of the pretest and posttest assessment categories of students' science process skills were then converted into value categories adapted from Nismalasari et al. (2016), and can be found in the table below:

Table 1. science process skills pretest and posttest assessment categories

No.	Nilai	Category
1.	81-100	Very Good
2.	61-80	Good
3.	41-60	Fair
4.	21-40	Less
5.	0-20	Very Poor

Sumber: (Nismalasari et al., 2016)

This grouping is divided into five categories, namely very good, good, fir, less, and very less. The division using 5 categories was also carried out by research conducted by Elvanisi et al. (2018), which is useful for interpreting the level of mastery of students' Science Process Skills. The formula used to calculate the average science process skills of students adapted from (Rahayu et al., 2021) used the following formula:

The average = $= \frac{x}{n} x100\%$

Description:

x: Score obtained

n: Number of students

The data obtained from the pretest and posttest assessments of students' Science Process Skills were then analyzed per aspect consisting of aspects of observing, measuring, classifying, predicting, concluding, and communicating. Then the average results of the pretest and posttest assessment categories of science process skills per aspect of students obtained from the results of data analysis are converted to a percentage in the value category adapted from (Nismalasari et al., 2016), and can be seen in table 1.

The formula used to calculate the percentage of students' science process skills adapted from (Rahayu et al., 2021), used the following formula:

percentage = $\frac{x}{n} x100\%$

Description:

x: Correct score

n: Total score

Furthermore, data analysis uses descriptive and inferential statistical tests. The analysis prerequisite test is a normality test using the U-Man Whitney test and uses SPSS version 25 so that data processing can be processed practically and produce qualified data results.

Results and Discussion

Based on research that has been conducted in control and experimental classes, the results of students' science process skills are obtained. The research that has been carried out aims to obtain an overview of the effect of the learning cycle 5 E learning model on the science process skills of fifth grade students. Data on the results of students' science process skills obtained from pretest and posttest scores totaling 15 multiple choice questions covering the six aspects of science process skills, namely observing, measuring, classifying, predicting, concluding, and communicating. At the beginning of the research implementation, in the control class, students were given pretest questions to determine the initial ability before learning and given posttest questions to determine the results after learning in the control class. The following is the data on the results of the pretest and posttest in the control class.

Table 2. Control Class Pretest and Posttest Data

Aspects of Science Process Skills	Pretest		Postest	
	%	Category	%	Category
Observing	84,21053	Very good	88,59649	Very good
Measuring	69,73684	Good	77,63158	Good
Classifying	50,87719	Fair	54,38596	Fair
Predicting	60,52632	Fair	61,84211	Good
Conclude	66,66667	Good	62,2807	Good
Communicate	71,05263	Good	61,84211	Good
Total	67,17836	Good	67,76316	Good

Based on this table, it can be seen that the average at the time of the pretest was 67% and the average at the time of the posttest was 68%, so there was an increase after learning in the control class. During the observation of students' abilities in the aspects of science process skills, the pretest and posttest results showed a diverse pattern. In the observing aspect, there was a significant increase from 84.21% in the pretest to 88.60% in the posttest, showing progress in the ability to observe. Meanwhile, the measuring aspect also increased from 69.74% to 77.63%, showing an increase in the ability to measure students from pretest to posttest. However, in the aspect of classifying, although there was an increase from 50.88% to 54.39%, this increase was relatively lower than other aspects. In the predicting aspect, although there was a small increase from 60.53% to 61.84%, but in the posttest, the ability category reached 'Good'. On the other hand, the inferring aspect showed a decrease from 66.67% in the pretest to 62.28% in the posttest, indicating a decrease in students' inferring ability. The same thing also happened in the aspect of communicating, where there was a decrease from 71.05% in the pretest to 61.84% in the posttest, indicating a decrease in the ability to communicate.

After obtaining the value data from the control class, the research continued in the experimental class to obtain an overview of the effect of the learning cycle 5 E learning model on students' Science Process Skills . Giving pretest questions is done to determine the initial ability before being given treatment and given posttest questions to determine the effect of the model given. The treatment was given by applying the learning cycle 5 E learning model which consists of 5 stages or E phases, namely engagement, exploration, explanation, elaboration, and evaluation. The Science Process Skills results obtained from the average after applying the learning cycle 5 E learning model can be seen in the following table.

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Table 3. Experimental Class Pretest and Posttest Data

Aspects of Science Process Skills	Pretest		Postest	
	%	Category	%	Kategori
Observing	85,58559	Very good	95,61404	Very good
Measuring	63,51351	Good	85,52632	Very good
Classifying	54,05405	Fair	64,03509	Good
Predicting	54,05405	Fair	65,78947	Good
Conclude	62,16216	Good	68,42105	Good
Communicate	68,91892	Good	73,68421	Good
Total	64,71471	Good	75,5117	Good

In observing learners' abilities in aspects of science process skills, the pretest and posttest results showed significant improvements in various aspects. First, in the aspect of observing, there was a considerable increase from 85.59% in the pretest to 95.61% in the posttest, showing real progress in the ability to observe learners. Furthermore, in the aspect of measuring, there was a significant increase from 63.51% in the pretest to 85.53% in the posttest, showing a great improvement in the ability to measure. In the aspect of classifying, there was an increase from 54.05% in the pretest to 64.04% in the posttest, this increase is still considered quite good. Meanwhile, in the predicting aspect, there was a significant increase from 54.05% in the pretest to 65.79% in the posttest, showing an increase in the ability of the predicting aspect. The concluding aspect also showed a good improvement from 62.16% in the pretest to 68.42% in the posttest. Finally, in the communicating aspect, there was a good increase from 68.92% in the pretest to 73.68% in the posttest, showing an increase in the ability of communicating learners. Overall, these results show the effectiveness of learning in improving students' science process skills in various aspects. The results of the data obtained in the control and experimental classes then conducted hypothesis testing. But before doing the hypothesis test, the data analysis prerequisite test is carried out first. This aims to ensure that the data to be analyzed meets the assumptions required for the analysis technique to be used.

Data Analysis Prerequisite Test

Normality Test

The normality test is carried out to evaluate whether the variables follow a normal distribution or not. Using the Kolmogorov-Smirnov method with a significance level of 5% or $\alpha < 0.05$. If the result is < 0.05, then the data is considered not to follow a normal distribution, and vice versa if > 0.05, then the data is considered to follow a normal distribution. he results of the analysis can be seen from the following table.

Table 4. Pretest and Posttest Normality Test

	Class	Kolmogorov-Smirnov[a]		
		Statistic	df	Sig.
Science Process Skills	*Pretest* experimental 5E	,164	37	,014
	Posttest experimental 5E	,115	38	,200*
	Pretest control 5C	,118	38	,200*
	Posttest control 5C	,159	38	,016

The results of data analysis show that the significance value for Pretest data in the experimental class is 0.014 which is less than 0.05 indicating that the data does not follow a normal distribution.Meanwhile, the significance value for the Pretest data in the control class is 0.200, which is more than 0.05, indicating that the data follows a normal distribution. For Posttest data, the significance value for the experimental class is 0.200, which is more than 0.05, indicating that the data follows a normal distribution, while for the control class it is 0.016, which is less than 0.05, indicating that the data does not follow a normal distribution. Therefore, it can be concluded that the Pretest and Posttest data for the experimental and control classes are not normally distributed.

U-Mann Whitney Pretest Difference Test

The U-Mann Whitney test is a non-parametric statistical test used to analyze nominal and ordinal data from populations that do not have a certain distribution. The criteria for making decisions from the statistical test results of the U-Mann Whitney Pretest Difference Test are if the significance value (sig.) is greater than 0.05, then the null hypothesis (H0) is accepted and the alternative hypothesis (Ha) is rejected, which means that there is no difference in the average pretest between the control class and the experimental class. Conversely, if the significance value is less than 0.05, then H0 is rejected and Ha is accepted, which indicates that there is a difference in the mean pretest between the control class and the experimental class. Based on the results of statistical analysis, the data tested were pretest data from the control class and experimental class. The result obtained is a significance value of 0.271, which is greater than 0.05. Therefore, H0 is accepted and Ha is rejected. Thus, it can be concluded that there is no significant difference between the science process skills of students who apply the learning cycle 5 E model in the experimental class and the science process skills of students who do not apply the model (control class) at pretest.

U-Mann Whitney Posttest Test of Difference

The U-Mann Whitney test results show a significance value of 0.011, which is less than 0.05. Therefore, the null hypothesis (Ho) is rejected and the alternative hypothesis (Ha) is accepted. Thus, it can be concluded that there is a significant difference between the science process skills of students who apply the learning cycle 5 E model (experimental class) and the science process skills of students who do not apply the model (control class) at posttest.

Effect Size Test

Effect size is used to assess how much impact the application of the learning cycle 5 E learning model has on students' science process skills. The greater the effect size value obtained, the greater the impact. Based on the effect size calculation that has been done, the learning cycle 5 E learning model has a moderate impact on students' science process skills. This is reinforced

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by the effect size test results which show a value of 0.618. Mathematically, the effect size formula can be written as follows:

$$\text{SD } Pooled = \sqrt{\frac{SD_1^2 + SD_2^2}{2}}$$

Where

$$Cohen's\ d = \frac{M1 - M2}{SD\ Pooled}$$

Based on this formula, the results are obtained:

$$\text{SD } Pooled = \sqrt{\frac{SD_1^2 + SD_2^2}{2}}$$

$$\text{SD } Pooled = \sqrt{\frac{13{,}1792^2 + 12{,}6911^2}{2}} = 12{,}937$$

$$Cohen's\ d = \frac{M1 - M2}{SD\ Pooled}$$

$$Cohen's\ d = \frac{76 - 68}{12{,}937} = 0{,}618$$

Discussion

Based on the results obtained, overall in the control class, it shows that students' understanding of various aspects of science process skills is still in the good category with an average percentage value of 67%, but with unsatisfactory results. Although there is an increase in the aspects of observing, measuring, classifying and predicting, there is still a decrease in results from pretest to posttest, namely in the aspects of concluding and communicating. Based on the results of interviews conducted with students in the control class, it is known that the decline occurred because students were not familiar with the concluding aspect. In addition, the lack of concentration when working on problems also affected the posttest results. The same thing also happened in the aspect of communicating, where there was a decrease of 10%. The decrease that occurred in the aspect of communicating was because students still did not understand reading tables or diagrams. In this case, a more targeted approach and a more interactive learning strategy may be needed to improve students' skills in practicing and applying the scientific process thoroughly. This is also proven by research conducted at SDN 24 Ganting Singgalang by (Lusidawaty et al., 2020) found that students' science process skills were still low, indicating the need for improvement in teaching and learning strategies.

Furthermore, in the experimental class, the results showed significant developments in the ability of students in various aspects of science process skills. In the aspect of observing, there was a significant increase of 10%. According to (Özalp, 2023) The reason the observing aspect of science process skills has increased is because this aspect gets a larger portion or emphasis in every learning activity at various grade levels. On the other hand, in the context of teaching, in the observation aspect, learners tend to be more active because they use all their senses. (Rahayu et al., 2021). Research conducted by (Nurhasannah, 2016) shows that the ability to observe is a basic scientific skill. By observing, learners can use all their senses, including sight, hearing, touch, taste, and smell. So that the ability to observe students has increased.

Meanwhile, in the aspect of measuring, there was a significant increase of 22%. Development was also seen in the aspect of classifying, with an increase of 10%. In addition, the predicting aspect also showed a significant increase of 11%. Although in the aspect of concluding and communicating, the increase was smaller, but still significant, in the aspect of concluding there was an increase of 6% and communicating by 5%. Thus, the results of this study show that the learning cycle 5 E model has had a positive impact in improving science process skills in all aspects observed. This is because the syntax of the learning cycle 5 E model

is in line and related to the Science Process Skills indicators. The following is the relationship between the syntax of the learning cycle 5 E model and the aspects of science process skills.

Table 5. Linkage between Science Process Skills aspects and the learning cycle 5 E model

Syntax of Learning Cycle 5 E Model	Aspects of Science Process Skills
Engagement	Involving the five senses to obtain information (observing)
	Making predictions (observing)
Exploration	Identifying size (Measuring)
Explaination	Expressing and classifying similarities or differences (Classifying)
Elaboration	Developing ideas in more depth (Predicting)
Evaluation	Describing conditions and investigating objects based on reality in the field (Concluding)
	Presenting and explaining the results of the investigation (Communicating)

The average results of Science Process Skills scores in the experimental class have increased. The average value at the time of the pretest can be known as 65% while at the time of the posttest it is 76%. This increase also occurred in every aspect of Science Process Skills. In addition to the connection between the Science Process Skills aspects and the syntax of the learning cycle 5 E learning model, the increase that occurred was also due to the application of the learning cycle 5 model researchers invited students to make a model of the human respiratory apparatus. The engagement phase is designed so that students can observe the respiratory organs directly. Then, in the exploration phase, students are invited to take direct measurements of the materials used to make a model of the human respiratory apparatus. According to (Mahmudah, 2017) the ability to measure can be improved through activities related to the development of units that correspond to various measures such as length, area, volume, time, weight, and others.

At the explanation stage, students' knowledge and understanding of the material to be presented can be effectively improved, which in turn can increase learning motivation. This stage helps train science process skills in classifying, starting from classifying tools and materials to the material discussed. Improvement in the prediction aspect is influenced by the elaboration stage, elaboration or expansion. This stage helps hone learners' ability to develop ideas that are applied in making models of breathing apparatus, which in turn will improve learners' ability to predict and have an impact on their science process skills. This is in line with the findings of research conducted by (Tosun, 2019), by incorporating predictive elements into science process skills can be seen as a positive step towards problem solving.

The improvement that occurred in the conclusion and communication aspects was due to the evaluation phase. After completing the making of the respiratory model, students are directed to make presentations so that they will train the communication aspect. Learners are also given the opportunity to comment. In the concluding stage, learners are asked to summarize the results of the learning they have done, as well as conclude the results of presentations made by other groups. Tables 1 and 2 show that the average score of the experimental class is higher

than the control class, indicating that the Learning cycle 5 E learning model has a positive impact on students' science process skills.

The application of the Learning cycle 5 E learning model has a positive impact on students' science process skills. Several studies have shown that applying the Learning cycle 5 E model can improve students' scientific learning outcomes and process skills. This evidence is reinforced by research conducted by (Wahyuningsih et al., 2023) at the elementary school level, this allows students to be actively involved in the learning process and foster a mindset that encourages scientific learning.

In addition, the Learning cycle 5 E learning model is also proven to have an impact on students' science process skills, in accordance with the findings of research conducted by (Yuniarsih et al., 2020). However, in this study, the impact provided was considered a relatively small impact, this was due to the lack of students' habits in using science process skills. This fact is in line with research conducted by (Saudhia et al., 2022) which shows that the low science process skills of students can be influenced by various factors, including the lack of familiarity of students with Science Process Skills.

According to B. Mirian (2023) a factor that can be attributed to learners' unfamiliarity with science process skills is the lack of opportunities for science teachers or natural science teachers to present in-depth and structured learning experiences to learners, which can hinder the process of developing science process skills. An additional influencing factor is the variation in the educational background of science teachers, which is not entirely in line with their level of competence in teaching and transferring science process skills to learners (Setiawan & Sugiyanto, 2020).

The impact Learners who are not familiar with science process skills tend to have limited conceptual knowledge of the process. In addition, the consequence of learners' lack of habit in applying science process skills is their possible difficulty in analyzing and solving problems using a scientific approach in various aspects of their daily lives (Deta et al., 2020).

The results of research on science process skills that have been carried out show that the application of KPS in classroom learning can provide various benefits for students, such as increasing understanding of science concepts, developing critical and analytical skills, as well as strengthening social abilities and learning independence. this is also evidenced by research conducted by (wahyudi etal,. 2024) which shows that science process skills result in a significant increase in elementary school students' science scores, demonstrating their effectiveness in improving understanding. this implication requires teachers to change their approach from simply conveying information to becoming facilitators who help students develop essential scientific skills for life outside the classroom. These implications require teachers to change their approach from simply delivering information to becoming facilitators who help students develop essential scientific skills for life beyond the classroom. Learning practices based on science process skills are able to create more meaningful, relevant, and interesting learning experiences for students, and prepare them for future challenges.

Conclusion

The research findings prove that the application of the Learning Cycle 5 E Learning Model has an influence on Science Process Skills on Human Respiratory System Material at MIN 2 Pontianak. Science process skills in the control class during the pretest obtained a good category and during the posttest also obtained a good category. Science process skills in the control class during the pretest obtained an average of 67 and during the posttest obtained an average of 68. Science process skills in the experimental class during the pretest obtained an average of 65 and during the posttest obtained an average of 76. The pretest and posttest results in the control and experimental classes were categorized based on table 1 and obtained a good category. Based on the results of hypothesis testing, it can be concluded that there is a difference between the control class and the experimental class with the results of the effect size test of

0.618, meaning that the application of the 5 E learning cycle model in the experimental class has a moderate influence on the science process skills of students.

Thus, further research can develop findings regarding the application of the Learning Cycle 5 E model by exploring several additional approaches. One of them is to use a different research design, such as a longitudinal study, to assess the impact of this learning model over a longer period of time and see changes in science process skills on an ongoing basis. In addition, research could explore other variables that might influence science process skills, such as students' learning styles, support from parents, or differences in teachers' teaching experience. Adding these variables may provide deeper insights into the factors that contribute to learning outcomes and how the Learning Cycle 5 E model can be adapted to increase its effectiveness. With this approach, research can provide more comprehensive recommendations for the development of learning models and their implementation in various educational contexts..

References

Annisa, Tusapipah, A., Agustin, A. S., Sandy, U. P., & Setyaningrum, V. (2023). Pengembangan Penilaian Keterampilan Proses Sains Untuk Siswa Kelas V Kota Pontianak. Konferensi Internasional Syekh Nurjati Tentang Pendidikan Dasar (Sicee), 144–154. Https:// Dx.Doi.Org/ 10.24235/ Sicee.V1i0.14564

B. Mirian, O. (2023). An Assessment Of Science Process Skills Among Science Students In River State, Nigeria. Journal Of Advance Research In Applied Science (Issn: 2208-2352), 9(3), 1–5. Https://Doi.Org/10.53555/Nnas.V9i3.1591

Danianty, N., & Sari, P. M. (2022). Hubungan Literasi Sains Dengan Keterampilan Proses Sains Pada Peserta Didik Kelas V Di Sekolah Dasar. Ideas: Jurnal Pendidikan, Sosial, Dan Budaya, 8(3), 1007. Https://Doi.Org/10.32884/Ideas.V8i3.894

Deta, U. A., Prakoso, I., Agustina, P. Z. R., Fadillah, R. N., Lestari, N. A., Yantidewi, M., Admoko, S., Zainuddin, A., Nurlailiyah, A., & Prahani, B. K. (2020). Science Process Skills Profile Of Non-Science Undergraduate Student In Universitas Negeri Surabaya. Journal Of Physics: Conference Series, 1491(1), 012067. Https://Doi.Org/10.1088/1742-6596/1491/1/012067

Elvanisi, A., Hidayat, S., & Fadillah, E. N. (2018). Analisis Keterampilan Proses Sains Siswa Sekolah Menengah Atas. Jurnal Inovasi Pendidikan Ipa, 4(2), 245–252.

Imran, Ali, Amini, Risda, & Fitria, Y. (2021). Pengembangan Modul Pembelajaran Ipa Berbasis Modellearning Cycle 5e Disekolah Dasar. Jurnalbasiceduresearch &Learninginelementary Education, 5(1), 343–349. Https://Doi.Org/10.31004/Basicedu.V5i1.691

Jasmidalis, D. A. S., Astari, T., Yulianingsih, I., Cahyanti, N. N., & Sarah, S. (2020). Evaluasi Seminar Nasional Online, Program Bermain Bersama Anak Selama Masa Pandemi Covid 19. Murhum : Jurnal Pendidikan Anak Usia Dini, 1(1), 65–78. Https://Doi.Org/10.37985/Murhum.V1i1.7

Lusidawaty, V., Fitria, Y., Miaz, Y., & Zikri, A. (2020). Pembelajaran Ipa Dengan Strategi Pembelajaran Inkuiri Untuk Meningkatkan Keterampilan Proses Sains Dan Motivasi Belajar Siswa Di Sekolah Dasar. Jurnal Basicedu, 4(1), 168–174. Https://Doi.Org/10.31004/Basicedu.V4i1.333

Mahmudah, L. (2017). Pentingnya Pendekatan Keterampilan Proses Pada Pembelajaran Ipa Di Madrasah. Elementary: Islamic Teacher Journal, 4(1), 168–187. Https://Doi.Org/10.21043/Elementary.V4i1.2047Nismalasari, Santiani, & Rohmadi, H. M. 2016. Penerapan Model Pembelajaran Learning Cycle Terhadap Keterampilan

Proses Sains Dan Hasil Belajar Siswa Pada Pokok Bahasan Getaran Harmonis: Edu Sains: Jurnal Pendidikan Sains Dan Matematika, 4 (2), 74-94. Https://Doi.Org/10.23971/Eds.V4i2.511

Nurhasannah. (2016). Pengguna Tes Keterampilan Proses Sains (Kps) Siswa Dalam Pembelajaran Konsep Kalor Dengan Model Inkuiri Terbimbing. Jurnal Ilmu Tarbiyah Dan Keguruan. Jakarta: Uin Syarif Hidyatulullah.

Oecd. (2019). Pisa 2018 Assessment And Analytical Framework Pisa. Paris: Oecd Publishing.

Oecd. (2023). Pisa 2022 Results (Volume I): The State Of Learning And Equity In Education. Oecd. Https://Doi.Org/10.1787/53f23881-En

Özalp, D. (2023). Science Curriculum Requirements: Science Process Skills In Textbook Activities. Journal Of Educational Research And Practice, 13(1), 123–141. Https://Doi.Org/10.5590/Jerap.2023.13.1.10

Prasasti, P. A. T. (2018). Efektivitas Scientific Approach With Guided Experiment Pada Pembelajaran Ipa Untuk Memberdayakan Keterampilan Proses Sains Siswa Sekolah Dasar. Profesi Pendidikan Dasar, 1(1), 16. Https://Doi.Org/10.23917/Ppd.V1i1.3623

Rahayu, S., Ahied, M., Hadi, W. P., & Wulandari, A. Y. R. (2021). Analisis Keterampilan Proses Sains Siswa Smp Pada Materi Getaran Gelombang Dan Bunyi. Natural Science Education Research, 4(1), 28–34. Https://Doi.Org/10.21107/Nser.V4i1.8389

Rohmatun, I. N., Atmojo, I. R. W., & Yulisetiani, S. (2024). The Effect of Fruit Audio Aroma Media on Basic Science Process Skills in Elementary School. Journal of Education Technology, 7(4), 636–644. https://doi.org/10.23887/jet.v7i4.61666

Saudhia, S., Luthfi, A., & Nurmalina, N. (2022). Pengaruh Model Children Learning In Science Terhadap Keterampilan Proses Sains Sekolah Dasar. Pedagogi: Jurnal Penelitian Pendidikan, 9(2), 145–154. Https://Doi.Org/10.25134/Pedagogi.V9i2.6620

Sayekti, I. C., & Kinasih, A. M. (2017). Kemampuan Guru Menerapkan Keterampilan Proses Sains Dalam Pembelajaran Ipa Pada Siswa Sekolah Dasar. Jurnal Profesi Pendidikan Dasar, 4(1), 97–105. Https://Doi.Org/10.23917/Ppd.V1i1.4464

Sari, L., & Shalihah, S. (2023). The Effectiveness of Learning Cycle 5E Model toward Students' Science Process Skills in Natural Science Subject. *Al-Adzka: Jurnal Ilmiah Pendidikan Guru Madrasah Ibtidaiyah*, *13*(1), 10–18. https://doi.org/10.18592/aladzkapgmi.v13i1.9148

Setiawan, A. M., & Sugiyanto, S. (2020). Science Process Skills Analysis Of Science Teacher On Professional Teacher Program In Indonesia. Jurnal Pendidikan Ipa Indonesia, 9(2), 241–247. Https://Doi.Org/10.15294/Jpii.V9i2.23817

Tosun, C. (2019). Scientific Process Skills Test Development Within The Topic "Matter And Its Nature" And The Predictive Effect Of Different Variables On 7th And 8th Grade Students' Scientific Process Skill Levels. Chemistry Education Research And Practice, 20(1), 160–174. Https://Doi.Org/10.1039/C8rp00071a

Upu, H., & Rezky, A. (2021). Model Pembelajaran Learning Cycle 5e (Engage, Explore, Explain, Elaboration, Evaluate) Berbasis Daring Dalam Pembelajaran Matematika. Seminar Nasional Hasil Penelitian, 1931–1943.

Wahyuningsih, R., Budianti, Y., & Aarrahim, A. (2023). Penerapan Model Pembelajaran Learning Cycle 5e Terhadap Hasil Belajar Ipa Siswa Sekolah Dasar. Jurnal Elementaria Edukasia, 6(2), 844–857. Https://Doi.Org/10.31949/Jee.V6i2.5087

Wahyuni, S., Irmawanty, & Hambali, H. (2024). Science Process Skills to Improve Learning Outcomes of Elementary School Students. JUDIKDAS: Jurnal Ilmu Pendidikan Dasar Indonesia, 3(2), 81–90. https://doi.org/10.51574/judikdas.v3i2.1229

Yuniarsih, N., Arfiani, Y., & Hayati, M. N. (2020). The Effect Of Learning Cycle 5e On Global Warming Theme To Encourage Students' Scientific Process Skills. Jurnal Pena Sains, 7(2), 60–67. Https://Doi.Org/10.21107/Jps.V7i2.6697