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THE EFFECT OF THE HANDS ON ACTIVITY LEARNING MODEL ON SCIENCE PROCESS SKILLS IN ELEMENTARY SCHOOL STUDENTS

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Abstract

This study aims to determine the effect of the application of the Hands on Activity learning model that is applied in elementary schools (SD) on natural science subjects (IPA), the research method used in this study is quasi-experimental where the research design used was a nonrandomized pretest-posttest control group design, the sample in this study was all third grade students at SDN Cikupa as the experimental group and grade III students at SDN Linggamekar as the control group. the average test for science subjects and the school environment that have similarities. The results of the study were obtained based on the calculation of the average difference in the t test, the P-value (Sig.2-tailed) = 0.343, so the P-value value $>\alpha$ which means that H0 cannot be rejected. This can be interpreted that there is no difference in the average final ability of students' science process skills between the experimental and control groups. However, based on the results of the KPS observations that have been tested by U Ngain m, it shows that the U test scores Sig. (2-tailed) = 0.000 then H0 is rejected, this means that there is a significant difference in increasing science process skills between learning using the Hands on Activity model and the conventional model. So, it can be concluded that learning using Hands on Activity on object motion material is influenced by shape and size better than learning using a conventional approach that includes lecture, question-and-answer and experimental methods.
Keywords: Science learning, science process skills, hands on activity.

Abstrak

Penelitian ini berjutuan untuk mengetahui pengaruh penerapan model pembelajaran Hands on Activity yang di terapkan di sekolah dasar (SD) pada mata pelajaran Ilmu pengetahuan alam (IPA), metode penelitian yang digunakan dalam penelitian ini adalah kuasi eksperimen dimana desain penelitian yang digunakan berupa nonrandomized pretest-posttes control group design, sample dalam penelitian ini adalah seluruh siswa kelas III di SDN Cikupa sebagai kelompok eksperimen dan siswa kelas III SDN Linggamekar sebagai kelompok kontrol pemilihan sample ini didasari karena sekolah iniberdasarkan nilai rata-rata ujian mata pelajaran IPA dan lingkungan sekolahnya yang memiliki kesamaan. Hasil dari penelitian yaitu didapat hasil berdasarkan perhitungan perbedaan rata-rata uji t didapat nilai P-value (Sig.2-tailed)= 0,343, sehingga Nilai P- value $>\alpha$ yang berati bahwa H0 tidak dapat ditolak. Ini dapat diartikan bahwa tidak terdapat perbedaan rata-rata kemampuan akhir keterampilan proses sains siswa antara kelompok eksperimen dan kontrol. Namun berdasarkan hasil observasi KPS yang telah di uji U Ngain m,enunjukan bahwa uji U nilai Sig. (2-tailed)= 0,000 maka H0 ditolak, ini berarti terdapat perbedaan peningkatan keterampilan proses sains yang signifikan antara pembelajaran yang menggunakan model Hands on Activity dan model konvensional. Jadi, dapat disimpulkan bahwa pembelajaran menggunakan Hands on Activity pada materi gerak benda dipengaruhi oleh bentuk dan ukuran lebih baik daripada pembelajaran menggunakan pendektan konvensional yang memuat metode ceramah, tanya-jawab dan percobaan.
Kata Kunci: Pembelajaran IPA, keterampilan proses sains, *hands on activity*

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INTRODUCTION

The Introduction presents the purpose of the studies reported and their relationship to earlier work in the field. It should not be an extensive review of the literature. Use only those references required to provide the most salient background to allow the readers to understand and evaluate the purpose and results of the present study without referring to previous publications on the topic. The introduction describes the background of the problem solved, the issues related to the problem solved, if there are any previous research reviews by other researchers relevant to the research undertaken.

Improving the quality of education in Indonesia is becoming a major concern by the government because if the quality of education continues to develop and improve properly then human resources will also increase and this will help improve the welfare of the country. One of the efforts to improve the quality of education carried out by the government is by updating the source material or textbooks, updating the curriculum, especially in Natural Sciences providing teaching aids.

This is done in line with the quality of Indonesian education which is in the 12th position out of 12 countries in Asia (Sujarwo, 2015). In addition, the decline in the quality of Indonesian education for several years is reinforced by data from PISA in 2018 based on an assessment of mathematics and science abilities, Indonesia is ranked 73rd and 71st of the 79 PISA participating countries (Hewi & Sholeh, 2020).

Science is a way to find out about nature systematically to master knowledge, facts, concepts, principles, discovery processes, and have a scientific attitude. Science education in elementary school is beneficial for students to learn about themselves and the natural environment. Science education emphasizes providing hands-on experience and practical activities to develop competencies so that students are able to explore and understand the natural surroundings scientifically. Science education is directed to "find out" and "do" so that it can help students to gain a deeper understanding of the natural environment (Apriliani et al., 2018).

Science is a science that offers ways to understand the events, phenomena and diversity that exists in the universe and the most important thing is that science provides an understanding of how to stay alive by adapting to these things. In fact, there are still many students who are so less motivated to learn, especially in science subjects, which seem monotonous and boring, so they cannot understand the material presented by the teacher properly. Participation is closely related to students' science process skills, if the teacher only explains the material in a conventional way, then students cannot participate actively in the learning process. Students only listen and record important things from the material presented by the teacher (Firdaus & Rahayu, 2019). The learning model tends to be boring so that students' science process skills cannot be improved. Whereas science subjects are closely related to providing direct experience for students both through experiments and observations so that they can improve the three aspects of student intelligence in accordance with national education goals which broadly divide them into three domains, namely the cognitive, affective and psychomotor domains (Firdaus & Rahayu, 2019).

In order for science learning to be more meaningful, students must be active in solving problems and finding their own answers, this can be done by students by doing experiments by utilizing the curiosity of students and teachers only as mentors and facilitators. In the experiment there are several things that need to be considered and improved, namely students' science process skills and students' scientific attitudes, this needs to be considered because there are still many teachers who use learning outcomes tests and do not use science process skills tests during the learning process so that teachers do not know the development of skills student science process (Kelana, 2018).

Hands on activities in the cognitive domain can be trained by giving tasks, namely deepening theories related to the Hands On Activity tasks being carried out, applying theory to real situations. The psychomotor domain can be trained by selecting, preparing, using tools or instruments appropriately and correctly. The affective domain is trained by planning activities, working together in groups, being honest and open, being disciplined in groups (Witarsa et al., 2017).

Science learning activities as described above by developing three components of science learning will be able to improve scientific processes, scientific products and foster scientific attitudes in students. Learning models that are considered to be able to improve students' science process skills are the hands on activity learning model, as stated by Witarsa et al (2017) that hands on activity is a model designed to involve students in digging for information and asking questions, doing activities and finding, collecting data and analyzing and making their own conclusions.

In this model students are given the freedom to construct thoughts and findings during activities so that students do it themselves without being burdened, having fun and high motivation so that learning will be more meaningful. Hands on activity in learning emphasizes the development of reasoning, building models, its relevance to real-world applications or

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everyday life and can make students have direct experience, so that they can overcome learning problems such as difficulty remembering subject matter. For this reason, this study will try to apply the hands on activity learning model to find out how it affects the improvement of students' science process skills.

Based on the conclusions above, it is necessary to conduct a study that shows how much influence hands-on activity-based learning has on science process skills, therefore the researchers conducted a study entitled the influence of hands-on activity-based learning models on elementary school students' science process skills with the aim of the research being to to find out the significant increase in students' science process skills in the matter of motion of objects influenced by shape and size in class III by using the hands on activity learning model, to determine the significant increase in students' science process skills in the matter of motion of objects influenced by shape and size in class III by using conventional learning models, and to find out the significant difference in the improvement of students' science process skills on the material of motion of objects influenced by the shape and size between students self using the hands on activity learning model with students using conventional learning. The novelty of this study when viewed from these statements is that this study compares the effectiveness of the hands on activity model with conventional learning on object motion material based on the analysis of previous studies, research on this matter has not been carried out.

METHOD

The method used in this research is quasi-experimental. with the design used in this study nonrandomized pretest-posttest control group design. The selection of this research design is considered appropriate because it is in accordance with the purpose of this study, namely to compare the effectiveness of learning (Borg, 2014; Levy & J. Ellis, 2011). The population in this study were all third grade students in Kuningan Regency with a sample of grade III students at SDN Cikupa as the experimental class and class III at SDN Linggamekar as the control class. The research instrument used an observation sheet for science process skills and a science process skills test, which consisted of 12 questions with 8 multiple choice questions and 4 short entries.

RESULTS AND DISCUSSION

Results

1. PretestResults

The pretest was carried out to determine the students' initial abilities before learning was carried out in the control group and the experimental group. The pretest was held on June 5, 2019 starting from the control group, namely in the third grade at SDN Linggamekar, which was then continued in the experimental group, namely the third grade at Cikupa elementary school. The pretest uses questions that have been validated through trials and consultations with experts, namely a matter of science process skills consisting of 8 multiple choice questions and 4 short entry questions on object motion material influenced by shape and size, indicators of science process skills used in research These are four indicators, each indicator is represented by three questions. In the range of values from 0-100 students the control group consisting of 31 students had an average score of 51.84 and the control group consisting of 30 students had an average score of 50.40, the difference in the average of the two groups was 1, 44. The average difference between the two groups can be seen in the following diagram:

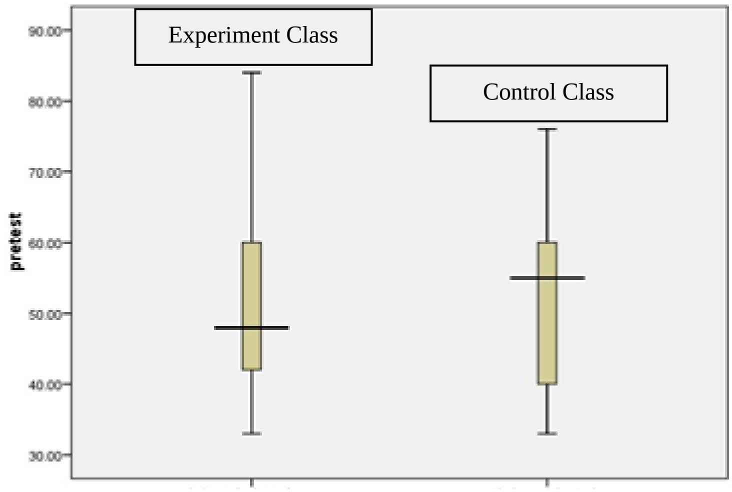

Figure 1. Pretest Results of Experiment Class and Control Class

The first stage after the pretest data from the experimental class and control class is collected is to carry out a data normality test using the normality test formula through the Liliefors test (Kolmogorov-Smirnov), this is done to determine whether the pretest data comes from data with normal distribution or not. The experimental class has a normality test value of 0.099 which is greater than the value of 0.05 indicating that the experimental group's pretest data comes from data that is normally distributed or H0 is accepted. The control class after the normality test has a value of 0.088 is greater than the value of = 0.05, this indicates that the pretest data of the control group is normally distributed or H0 is accepted. Judging from the explanation above, it can be concluded that the experimental group came from data that was

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normally distributed and the control group also came from data that was normally distributed. After the normality test and normal distribution were carried out, it was continued to the homogeneity test.

After the normality test was carried out and it was known that the two groups, namely the experimental group and the control group, both showed normal distribution of data, it was continued by conducting a homogeneity test. The homogeneity test was carried out to determine if two groups of sample data came from populations that had the same variance or not. The result of calculating the pretest homogeneity test is = 0.598, this shows that H0 is accepted. So, it can be concluded that the initial ability of the science process skills of the experimental group and the control group both had the same variance or homogeneity. Then a t-test was carried out, this was done to determine whether there was an average difference or not from the results of the pretest of the two groups, namely the experimental group that would get The treatment uses the Hands on Activity model and the control group will receive treatment using a conventional approach that includes lecture, question-and-answer and experimental methods. The results of the t test calculation = 0.660. This proves that there is no difference in the average value of students' science process skills in the experimental class and the control class before being given treatment. So, the initial ability of the science process skills of the two groups was the same.

2. Posttest Results

Learning in the experimental class was carried out in two consecutive meetings for two days, the first meeting did not use the posttest, the posttest was carried out at the second meeting after the learning was finished. The posttest was carried out after learning, precisely on June 19, 2019, starting from the experimental group, namely SDN Cikupa, which the day before received learning using the Hands on Activity model for two meetings. The posttest was continued to the control group, namely SDN Linggamekar which on the previous day had received learning using a conventional approach which included lecture, question-and-answer and experiment methods which were held in two meetings at each elementary school.

The purpose of the posttest is to determine the final ability of students' science process skills in both groups after being given treatment, namely the experimental group learning using the Hands on Activity model and the control group using a conventional approach. The posttest uses the same questions as the questions used during the pretest, which consists of 12 questions consisting of 8 multiple choice questions and 4 short questions. In the range of values from 0-100 students the experimental group consisting of 30 students had an average value of 79.40

and the control group consisting of 31 students had an average value of 76.03. The average difference between the two groups is 3.37. The posttest data from the experimental class and control class were then analyzed and processed using the normality test, homogeneity test and t test.

The posttest data from the experimental class and the control class were then tested for normality using the normality test formula through the Liliefors test (Kolmogorov-Smirnov), this was done to determine whether the posttest data came from normally distributed data or not. Based on the calculation the experimental class has a normality test value of 0.147 which is greater than the value of = 0.05 indicating that the posttest data of the experimental group comes from data that is normally distributed or H0 is accepted, and for the control class after the normality test has a value of 0.200 greater than the value of = 0.05, this indicates that the posttest data of the control group is normally distributed or H0 is accepted. So, it can be concluded that the experimental group and the control group came from data that were normally distributed.

After the normality test was carried out and it was known that the two groups, namely the experimental group and the control group, both showed normal distribution of data, it was continued by conducting a homogeneity test. From the calculation of the homogeneity test the experimental group and the control group have a value of = 0.292. So, it can be concluded that the final ability of the science process skills of the experimental group and the control group after being given the same treatment varied or homogeneous. Next, a t-test was carried out, this was done to determine whether there was an average difference or not from the results of the pretest of the two groups, namely the experimental group and the control group. The results of the t test calculation show the number 0.343. This proves that there is no difference in the average value of students' science process skills in the experimental class and control class after being given treatment. So, the final ability of the science process skills of the two groups is the same.

3. improving students' science process skills using the hands on activity learning model

From the calculation of the average difference between the pretest and posttest results of the experimental group using the t test and with = 0.05, the P-value (Sig.2-tailed) = 0.000 is obtained. Because it is tested in one direction, the value of 0.000 is divided by two so that the result is 0. This shows that the P-value < then H0 is rejected and H1 is accepted. So, it can be concluded that there is an increase in science process skills after the application of the hands

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on activity learning model on the material of motion of objects is significantly affected by the shape and size in class III SDN Cikupa. The full details can be seen in the following graph.

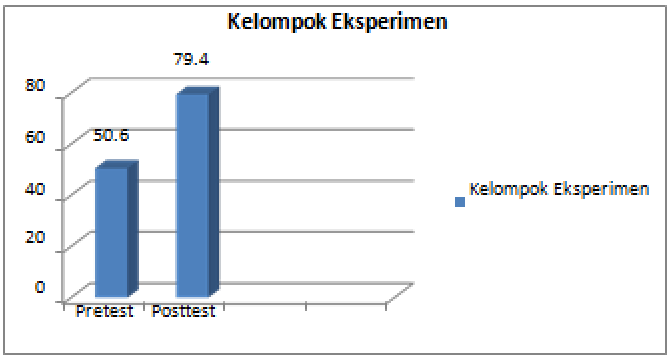

Figure 2. Average Pretest and Posttest Experimental Group

4. Improving students' science process skills using conventional learning

From the calculation of the average difference between the results of the pretest and posttest of the control group using the t-test, it was obtained that the P-value (Sig.2-tailed) = 0.000 because it was tested in one direction, then 0.000 was divided by two, namely 0. This value indicates that the P-value < is means H0 is rejected. So, it can be concluded that there is an increase in students' science process skills after the application of conventional learning on object motion material is significantly affected by shape and size in class III SDN Linggamekar. The full details can be seen in the following figure.

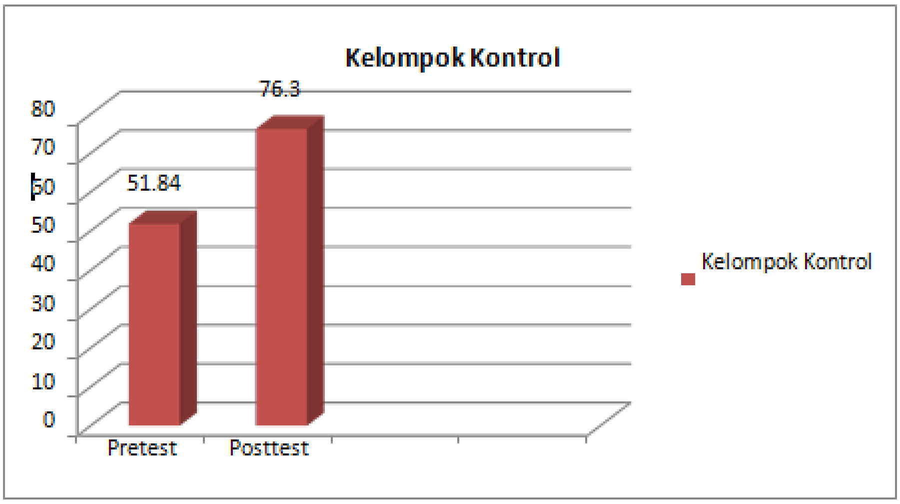

Figure 3. Average Pretest and Posttest Control Group

5. The difference in increasing students' science process skills between students who use the hands on activity model and students who use conventional learning

The U-test was conducted to determine the difference in the average increase in students' science process skills in the experimental group and the control group. The results of calculating the difference in average improvement using the U-test are as follows:

Table 1. Ngain Test

	Gain
Mann-Whitney U	.000
Wilcoxon W	496.000
Z	-6.714
Asymp. Sig. (2-tailed)	.000

Judging from the table above the value of Sig. (2-tailed) = 0.000 then H0 is rejected, this means that there is a significant difference in increasing science process skills between learning using the hands on activity model and the conventional model. So, it can be concluded that learning using Hands on Activity on object motion material is influenced by shape and size better than learning using a conventional approach that includes lecture, question-and-answer and experimental methods. The full details can be seen in the following figure.

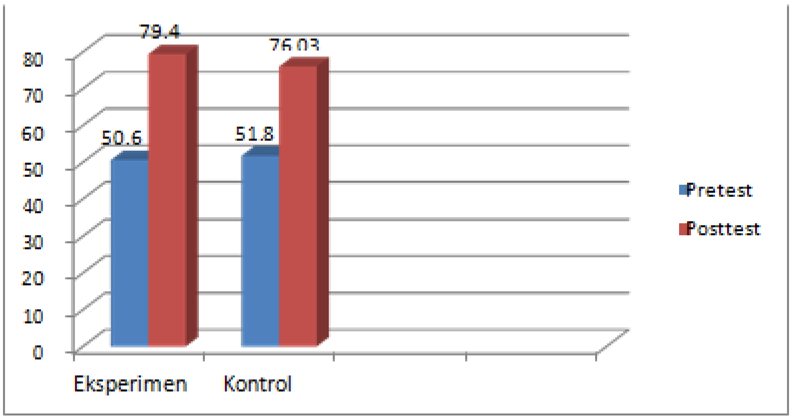

Figure 4. Average Pretest and Posttest Values of Experiment and Control Group

Discussion

Learning with hands on activity model

Learning in the experimental class, namely at SDN Cikupa, was carried out on June 5 and 6, 2019. Learning in the experimental class used a hands on activity learning model which was carried out in two meetings. The first meeting in the experimental class begins with the teacher saying greetings, inviting students to pray before studying, checking student

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attendance, conditioning students to be ready to learn, conveying learning objectives and the teacher doing apperception by asking student representatives to demonstrate the experiment, namely dropping small and large stones simultaneously, this stage is included in the first stage in the hands on activity model, namely the orientation stage.

At this stage an interesting finding is that students feel enthusiastic when their friends' representatives drop large and small stones, there are five students who really want to do demonstrations like their friends did, they scramble with each other to drop small and large stones, they feel interested because usually they just directly record the material from the book only. This shows that one of the goals of the hands on activity model is to increase the involvement of students in finding and processing learning materials that appear during the implementation of learning (Kibga et al., 2021).

The second stage in learning to use hands on activity is to formulate hypotheses with the teacher's activity dividing students into 5 groups with the number of students in each group of 6 students, the teacher guiding students to formulate hypotheses about the problems proposed by their friends at the stage of formulating problems, after students are given time and finish doing hypotheses, the teacher asks the representative of each student to write his hypothesis in front of the class, this is intended so that students are able to make provisional guesses or temporary answers (Ate & Eryilmaz, 2011).

On the second day the teacher continued the learning carried out the previous day with different material, at this stage the teacher carried out the same learning as the previous day, namely based on the hands on activity stage and further improved things that were still lacking on the first day of learning. At the stage of formulating the hypothesis, the teacher had difficulty grouping students, so on the second day when the teacher divided the students into several groups to conduct an experiment, the teacher divided the students by dividing the students by dividing the paper with the names of the animals after all the students were given the opportunity to find friends, namely the name of the same animal. With this modification, students who were difficult to group at the first meeting became very enthusiastic to study in groups, in line with what was stated by Asha & Hawi (2016) the teacher creativity in manipulating the conditioning process. This helped positively in the learning process.

Conventional learning

Learning in the control class was carried out on 7 and 8 June 2019, learning was carried out at SDN Linggamekar first. Learning in the control class uses the lecture, question-and-answer and experimental methods. In the initial activities in the control class, the teacher said greetings, invited students to pray before studying, and checked student attendance.

The findings when learning took place in the control class, namely at SDN Linggamekar, when the learning took place, students did not feel strange about grouping because the elementary school was used to working in groups. Barriers from students during the experiment were the same as those experienced by students at SDN Cikupa, students had difficulty in providing explanations of their answers. An interesting finding at the time of question and answer of students who asked was that only students excelled (Rahayu & Nugraha, 2018).

In the core activity the teacher explains the material motion of objects is influenced by shape and size and asks students to take notes, when students take notes and the teacher explains there are six students who are not silent, some are chatting, and some are playing with their toys. This may be because students feel bored with learning that uses the teacher method (Kubischta, 2014). After the students finished recording the material the teacher divided the students into three groups, when the teacher divided the students into several groups the students felt confused because they were not used to studying in groups (Karacop & Diken, 2017).

CONCLUSION

Based on the data obtained and data analysis in the previous chapter about the influence of the hands on activity learning model on students' science process skills on the material of motion of objects influenced by shape and size, it can be concluded there is an increase in the science process skills of students in third grade in the matter of motion of objects influenced by shape and size by using the hands on activity learning model and by using conventional learning which includes lecture, question-and-answer and experimental methods. Aside from that there is no significant difference in the improvement of science process skills in the material motion of objects influenced by the shape and size between students who use the hands on activity model and students who use the conventional approach, but when viewed from the results of observations of students' science process skills, learning using the model hands on activity is better in improving science process skills compared to conventional learning models.

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