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PAKEM learning models improve the science process skills of Group B children

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ABSTRAK

Keterampilan proses sains meliputi keterampilan mengamati, mengklasifikasikan, membandingkan, mengukur, komunikasi dan eksperimen. Hanya saja tidak semua siswa mampu menguasai keterampilan proses sains dengan baik, sehingga diperlukan penerapan metode pembelajaran yang tepat guna meningkatkan kemampuan proses sains siswa. Adapun tujuan dari penelitian ini yakni untuk mengetahui pengaruh model pembelajaran PAKEM terhadap keterampilan proses sains anak kelompok B. Jenis penelitian yang dilaksanakan merupakan penelitian eksperimen semu dengan rancangan penelitian pretest – posttest control group design. Populasi pada penelitian ini yaitu berjumlah 80 0rang. Sampel pada penelitian ini yaitu kelompok eksperimen berjumlah 25 orang, sedangkan kelompok kontrol sebanyak 28 orang. Data hasil keterampilan proses sains dikumpulkan dengan menggunakan instrumen berupa lembar observasi. Selanjutnya di analisis dengan menggunakan teknik analisis statistik deskriptif dan inferensial (Uji-t). Hasil analisis deskriptif diperoleh skor rata-rata kelompok eksperiman lebih besar dari skor rata-rata kelompok kontol. Berdasarkan hasil analisis data tersebut, maka dapat disimpulkan bahwa terdapat pengaruh yang signifikan model pembelajaran PAKEM terhadap keterampilan proses sains anak kelompok B.

ABSTRACT

Science process skills include observing, classifying, comparing, measuring, communicating, and experimenting. Not all students can master science process skills well, so it is necessary to apply appropriate learning methods to improve students' science process skills. This study aimed to determine the PAKEM learning model's effect on group B children's science process skills. The type of research carried out was a quasi-experimental study with a pretest-posttest control group design. The population in this study is 80 people. The sample in this study, the experimental group, consisted of 25 people, while the control group consisted of 28 people. Data on the results of science process skills were collected using an instrument in the form of an observation sheet. It was analyzed using descriptive and inferential statistical analysis techniques (t-test). The descriptive analysis results obtained that the experimental group's average score was greater than the average score of the control group. Based on the results of the data analysis, it can be concluded that there is a significant influence of the PAKEM learning model on the science process skills of group B children.

1. INTRODUCTION

Science process skills are defined as scientific skills that students can use to discover, acquire, develop, and apply concepts, principles, laws, and scientific theories in the form of mental, physical, and social abilities through thought processes critically, creatively, and systematically (Gasila et al., 2019; Nurqolbi et al., 2019; Yunita & Nurita, 2021). Science process skills are skills that students need to compete in the era of globalization (Fajriah et al., 2017; Nia et al., 2019). Science process skills are very important in the world of education because, with the development of science process skills, basic competencies will also develop, such as students' scientific attitudes and problem-solving skills, so that creative, competitive, innovative, and critical students can be formed (Emrisena et al., 2018; Gasila et al., 2019; Hasanah, 2017). A teacher does not allow to act as the only person who can transfer facts and theories, so science process skills are needed to be applied in the learning process. Learning that is carried out by developing science process

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skills is not only carried out by introducing students to what already exists but rather by inviting students to learn about how to find new knowledge so that students can learn actively and creatively (Hartati et al., 2022; Yunita & Nurita, 2021). Based on this, it can be seen that the introduction of science is very important to be applied to early childhood because the introduction of science can stimulate children to think critically about their environment (Gading et al., 2019; Khairunnisa et al., 2020).

It's just that the reality shows that the learning process in schools still needs to optimize some of the skills contained in students. It is because learning in class is still general and theoretical and does not familiarize students with using critical thinking abilities (Nur et al., 2020; Tadhkiroh et al., 2023). The observations made at the Kindergarten in Tukadmungga Village show that skills regarding children's science processes still need improvement. It can be seen in the skills of classifying, differentiating, observing, measuring, and communicating again that still need to be improved. Some children still cannot classify or classify an object, cannot distinguish and equate objects, and still cannot know the characteristics of an object. In addition, communicating could be more optimal when the child is asked again about the causes and effects of phenomena that occur in the surrounding environment. In addition to observing children, researchers also conducted interviews related to applying science process skills that have been applied to children. From the information obtained, children have never been invited to practice directly in science learning. Providing information about science learning is only done theoretically, in which teachers explain natural phenomena that occur to children. In addition to the lecture method, children are only invited to observe a picture in a book or magazine. It happens because various media that support the practice still need to be improved. If left continuously, these problems will certainly impact the low ability of children's thinking.

From the problems found in the field, it is necessary to have a new teaching strategy so that children are more active in participating in learning activities. Strategies that can make children active in participating in science learning should be able to create fun learning that can make children interested in participating in learning (Kaban et al., 2020; Laksmi et al., 2020). Strategies that can make children interested in learning can be done by applying active, creative, effective, and fun learning models (PAKEM). The PAKEM learning model is a child-centered learning model (student-contest learning) and is fun so that students are motivated to learn on their own, and so they don't feel burdened (Mustafa & Roesdiyanto, 2021; Purwanto, 2018; Wahab et al., 2021). The PAKEM learning model can be used as a guide for teachers to develop developmental aspects. PAKEM is a learning model that guides action to achieve set goals (Laksmi et al., 2020; Sidabutar, 2019). The application of the PAKEM model can help students to be more active in the process of observing, classifying, measuring, communicating with teachers or peers, comparing, and being brave in trying experiments (Hasanah, 2020; Martinus & Emjosupa, 2022; Samosir et al., 2020). In addition, in the learning process, students will feel happy if invited to practice science because the media and tools used vary. Inviting children to observe, measure, compare directly, and experiment will inadvertently develop creativity about what they are doing (Kaban et al., 2020; Pradnyawathi & Agustika, 2019).

Previous studies have revealed that the tri hita karana-based PAKEM model significantly affects fourth-grade students' writing skills (Pradnyawathi & Agustika, 2019). The results of other studies revealed a significant influence of the Tri Kaya Parisudha-based PAKEM learning model on the civics knowledge competence of fourth-grade elementary school students (Laksmi et al., 2020). The results of subsequent research also revealed a significant influence of the manual learning model on elementary school's fifth-grade learning outcomes (Kaban et al., 2020). Based on some of the results of these studies, the PAKEM learning model affects student learning outcomes. It's just that in previous studies, no studies specifically discussed the effect of the PAKEM learning model on kindergarten students' science process skills. So this research was focused on this study to know the effect of the PAKEM learning model on the science process skills of group B children at the Kindergarten in Tukadmungga Village.

2. METHOD

The type of research used in this research is quasi-experimental research. It is quasi-experimental because not all variables and experimental conditions can be regulated or controlled strictly. This research used a pretest-posttest control group design because this research was conducted to find out the differences in science process skills before being given the PAKEM learning model, then to find out the differences in science process skills between groups of students who were given the PAKEM learning model and groups of students who were not given the model. PAKEM learning. The population in this study were all group B children at the Tukadmungga Village Public Kindergarten for the 2022/2023 academic year, totaling 80 people. In this study, the sample selection technique used to select the control and experimental classes was a random sampling technique by drawing many classes. This technique is used as a sampling technique

because the individuals in the population have been distributed into classes, so it is impossible to randomize (randomize) the individuals in the population.

The data collection method used is the observation method. Observation is a complex process composed of various biological and psychological processes. In this technique, the most important is the process of observation and memory. Collecting data by observation is used when the researcher is concerned with human behavior, work processes, and natural phenomena and when the observed respondents are manageable. The science process skills instrument consists of 20 statement items that contain science process skills. Testing the instrument's validity was carried out by giving the instrument to 2 experts. The test results were analyzed using the Gregory formula and entered into the cross-tabulation table. Based on the results of the content validity test of the observation guideline, the results were obtained, and all items were declared relevant so that they were feasible to be used as a guideline for observing science process skills. The lattice of science process skills instruments can be seen in Table 1.

Table 1. Instruments of Science Process Skills

No	Dimension	Indicator	Items	Total
1	Observation / Observation	Involve the senses in observing objects	1,2,3	3
2	Classification	Classify by color	4	3
		Classify by size	5	
		Classify by type (solid, liquid, and gas)	6	
3	Measurement	Measure the amount of water using a plastic cup	7,8	4
		Measure out the amount of water using a plastic spoon	9,10	
4	Compare	Knowing the object equation	11,12	4
		Know the difference between objects	13,14	
5	Communication	Communicate about the initial form before the change	15,16	4
		Communicate about the changes that occurred after the practice	17,18	
6	Experiment	Children try to do simple experiments	20	2
		Total		**20**

The data obtained in the study were then analyzed using statistical analysis methods, which can be divided into descriptive and inferential statistics. The data presented in descriptive statistics is the mean, median, mode, standard deviation, and variance calculation. Inferential statistics is the application of inferential statistical formulas to test the hypotheses proposed in research and draw conclusions. Inferential statistics consists of analysis, prerequisite testing, and hypothesis testing. The research prerequisite test includes the normality test and homogeneity test. The statistical analysis used to test the research hypothesis is the mean difference test (t-test).

3. RESULTS AND DISCUSSION

Result

This study obtained results that were the objectives of this study, to see the significant effect of the PAKEM learning model on the science process skills of group B children in the State Kindergarten in Tukadmungga Village. The science process skills of the pretest experimental group obtained the highest score of 44, the lowest score of 38, a standard deviation of 1.756, a mean of 40.80, a median of 41.00, a mode of 40, and a variance of 3.083. Then the results of the analysis of science process skills in the posttest group obtained the highest score of 66, the lowest score of 60, a standard deviation of 1.801, a mean of 62.76, a median of 63.00, a mode 63, and a variance of 3.523.

Based on the results of data analysis, it is known that the pretest control group's science process skills obtained the highest score of 44, the lowest score of 37, a standard deviation of 2.094, a mean of 40.64, a median of 40.00, a mode 40 and the variance 4.386. Then the results of the analysis of science process skills in the posttest group obtained the highest score of 50, the lowest score of 41, a standard deviation of 2.331, a mean of 44.39, a median of 4400, the mode of 45 and a variance of 5.433. Furthermore, to determine the significant effect of the PAKEM learning model, it is necessary first to test the prerequisite analysis. Analysis prerequisite tests can be normality tests and variance homogeneity tests. The normality test determined whether the research data distribution was normally distributed. The data distribution

normality test was carried out using SPSS 25.0 for Windows. The results of the normality test for the data distribution of the experimental and control groups can be seen in Table 2.

Table 2. Results of the data distribution normality test

Group		Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
KPS	Experiment	0.111	25	0.200	0.941	25	0.152
	Control	0.112	28	0.200	0.958	28	0.308

Based on the results of the normality test using SPSS 25.0 for Windows, it can be seen that the significance score (Sig) for all data in both the Kolmogorof-Smirnov test and the Shapiro-Wilk test is > 0.05. It means that the distribution of data on science process skills of children in groups given the PAKEM learning model with the group that was not given the normally distributed PAKEM model. After the normality test results were obtained, the data analysis continued with the homogeneity of variance test, which was carried out based on the science process skills data of children given the PAKEM model and data on groups of children not given the PAKEM model. The number of each child is 25 children in the experimental group and 28 children in the control group. To determine the homogeneity of variance test using the F test because it only compares the experimental and control groups' data. The calculation criteria are if the significance score is > 0.05, then the sample is homogeneous, and if the significance score is ≤ 0.05, then the sample is not homogeneous. The results of the variance homogeneity test can be seen in Table 3.

Table 3. Variance Homogeneity Test

	Levene Statistic	df1	df2	Sig.
Based on mean	0.807	1	51	0.373

Based on the results of the homogeneity test with the Levene test technique, it was carried out by selecting one of the statistics, statistics based on an average (based on mean) with a sig of 0.373 (> 0.050), so it can be concluded that the variance between the experimental group and the control group is homogeneous. Based on the results of the normality test and homogeneity test of variance, it was found that the data for the group given the PAKEM model and the group not given the PAKEM model had a normal distribution, and the variances of the two groups were homogeneous. Based on the hypothesis test used using SPSS 25.0 for Windows. The calculation criteria are a significance score <0.05, then H0 is rejected, and H1 is accepted, and a significance score > 0.05, then H0 is accepted, and H1 is rejected. Based on the results of the t-test calculation, the significance score of science process skills is 0.000 <0.05 significance level (0.000 <0.05) so that it can be concluded that H0 is rejected and H1 is accepted, so there is a significant influence of the PAKEM learning model on science process skills group B children in Tukadmungga Village State Kindergarten.

Discussion

The results of the data analysis showed that students who were taught using the PAKEM learning model and those who were not taught the PAKEM model had different abilities. Learning in the experimental class using the PAKEM model was superior to the students not given the PAKEM model. It is because the PAKEM learning model can create an active and fun learning atmosphere for students. Applying the PAKEM model in teaching and learning activities can involve students directly and make it easier for children to understand the material provided (Kaban et al., 2020; Pradnyawathi & Agustika, 2019). Learning models that can arouse or build student activity will certainly increase student understanding in learning. The PAKEM learning model can affect science process skills because PAKEM learning contains four important aspects: active, creative, effective, and fun (Hasanah, 2020; Martinus & Emjosupa, 2022). The first aspect, active learning, improves science process skills because this aspect requires students to be directly active in the learning process. In this case, students are directly allowed to play an active role in observing, classifying objects, measuring, comparing, communicating, and conducting experiments (Laksmi et al., 2020; Sidabutar, 2019). Active learning (active learning) is a learning method in which students are actively or experience involved in the learning process (Koryati et al., 2020). Active learning can increase students' emotional intelligence. Students' emotional intelligence can be in the form of intelligence to recognize emotional causes (Mustafa & Roesdiyanto, 2021; Samosir et al., 2020). Active learning strategies include various ways to make students active through activities that build group work. Learning is not just pouring out material into the minds of students. On the contrary, it requires the involvement and actions of the

students themselves so that students' activeness is very much needed in the learning process (Kaban et al., 2020; Koryati et al., 2020).

The second aspect is the creative aspect, where students are invited to think creatively about solving problems encountered when children observe an object (Rafikasari et al., 2021). Creative learning emphasizes how the teacher facilitates learning activities to make the learning atmosphere more conducive. So that creative learning can improve various student skills because of teaching strategies that teach students to think critically (Ilahiyah et al., 2019; Wijayanti & Efendi, 2021). Creative learning requires children to think critically about how to solve a problem. Besides being able to affect the cognitive aspects of students, creative learning can also increase children's interest in reading outside of school. Creative learning is very much needed in learning, both at and outside of school, to increase interest in reading in children, as with learning in which new things increase student interest in participating in learning. Therefore creative learning can also improve student skills.

The third aspect is the fun aspect which is carried out by choosing and applying the method of delivering the material so that it is not boring. Fun learning can increase student learning motivation by pushing yourself without coercion and coming from within yourself (Nur et al., 2020; Tadhkiroh et al., 2023). Fun learning is a learning design to create an atmosphere that frees students to dare to try, act, ask questions, and express opinions (Hartati et al., 2022; Yunita & Nurita, 2021). This fun learning allows children to be creative under the teacher's supervision. Fun learning can also foster children's interest in learning (Emrisena et al., 2018; Gasila et al., 2019; Hasanah, 2017). Applying fun learning will increase students' interest in the lesson. Increased student interest in the lesson, the resulting learning outcomes will be by the expectations of the learning design. The results obtained in this study are in line with the results of previous studies, which also revealed that the Tri Hita Karana-based PAKEM model had a significant effect on fourth-grade students' writing skills (Pradnyawathi & Agustika, 2019). The results of other studies revealed a significant influence of the Tri Kaya Parisudha-based PAKEM learning model on the civics knowledge competence of fourth-grade elementary school students (Laksmi et al., 2020). Further research also revealed a significant influence between the standard learning model on fourth-grade learning outcomes in elementary school (Kaban et al., 2020). Based on some of the results of these studies, the PAKEM learning model affects student learning outcomes.

4. CONCLUSION

Based on the data analysis and discussion results, the experimental group's average score on the science process skills was higher than that of the control group. These results show a significant influence of the PAKEM learning model on the science process skills of group B children in kindergarten. This significant effect means that the PAKEM learning model improves the science process skills of group B children in kindergarten.

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