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The Effect of Simple Experiments on the Science Process Skills of 5-6 Year Old Children

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Abstract
This study aims to: (1) determine the application of simple experimental activities in children aged 5-6 years at Al-Khairat Kalumpang Kindergarten, (2) know the science process skills of children aged 5-6 years at Al-Khairat Kalumpang Kindergarten, (3) know the effect of simple experiments on the science process skills of children aged 5-6 years at Al-Khairat Kalumpang Kindergarten. This type of research is Quantitative Research with a research design using One Group Pretest-Postest Design. The population and sample of the study were 20 children of group B1. Data Collection Techniques through observation and documentation and data are analyzed through Normality test and t-Test. The results of this study show that (1) the application of simple experimental activities is carried out through three treatments, namely the Floating Drowning experiment, the experiment of dissolving and insoluble in water and the experiment of objects that absorb and do not absorb water, (2) Science Process Skills for children aged 5-6 years in Al-Khairat Kalumpang Kindergarten, namely Observation Skills, Grouping / Classifying Skills and Communication Skills. This can be seen in the value of each stage carried out, namely during the pre-test (5.95%), the first treatment (Experiment I) of (6.65%), the second treatment (Experiment II) of (8.75%), the third treatment (Experiment III) of (10.9%) and the post-test of (13.5%). (3) Simple Experiment has an effect on children's science process skills based on the results of the t-count test is -19.615 with a significant level of 0.001. Because of the significant <0.05, it can be concluded that Ho was rejected and H1 was accepted which means that there is a simple experimental effect on the science process skills of children aged 5-6 years in Al-Khairat Kalumpang Kindergarten.

Keywords: *Simple Experiment, Science Process Skills, 5-6 Year Olds*

INTRODUCTION

Early childhood education or Kindergarten is an education that facilitates the comprehensive growth and development of children or emphasizes on all dimensions of child development, including religious and moral values, cognitive, physical motor, socio-emotional, language, and arts (Dewi, 2012). Early childhood is also a very important age for child development. Hence, it is referred to as the golden age (Nursin et al., 2023). One research result states that the intelligence capacity of children at the age of four has reached 50%. This capacity will increase to 80% at the age of eight. This indicates the importance of stimulating early childhood (Fatimah, 2020). Therefore, the activities provided should be able to make children interested and focused on learning, so that children will enjoy participating in the learning process not because of coercion. Through science activities, children will use their cognitive development to solve problems (Maftutah, Jannah, & Utama, 2021). During the science activity process, children will observe, predict, investigate, and test the experiments conducted (Yuliani, 2010).

Science learning conducted in Kindergarten is also integrated learning, so that science learning can be integrated with other developmental areas and plays a very important role in helping to lay the foundation for expected human resource capabilities (Djamarah, S. B., & Zain, A. 2010). The rapid development of science does not allow teachers to provide information on all facts and concepts to students, thus requiring a learning condition that can motivate children to prepare for learning as a whole, not only focusing on mastering concepts but also science process skills (Mirawati & Nugraha, 2017).

There are various skills in process skills, consisting of basic skills and integrated skills. Basic skills consist of six skills: observation skills, classification skills, prediction skills, measurement skills, inference skills, and communication skills (Tanu, 2019). While integrated skills consist of: identifying variable skills, making data tabulations, presenting data in graphical form, describing relationships between variables, collecting and processing data, analyzing research, formulating hypotheses, defining variables operationally, designing research, and conducting experiments (Hasibuan & Suryana, 2021). Science process skills should be trained through simple experiments or trials. These experiments can train children to link cause and effect of a treatment so that children can think logically (Loukatari, Matsouka, Papadimitriou, Nani, & Grammatikopoulos, 2019). Science learning development activities should also be done through play to create a fun atmosphere that attracts children's interest to actively engage in every science process skill they learn (Lamiya, Hakim, Nugraha, & Gustiana, 2020).

Based on the observations conducted at Al-Khairat Kalumpang Kindergarten in group B, which consists of children aged 5-6 years old, the science learning process conducted is still limited to introduction using textbooks, so children are not directly involved in the science process. During science learning, children only see, hear, and listen to what is explained by the teacher, so their science process skills have not

developed well. Most children still have difficulty making predictions, classifying or grouping, and communicating. The difficulty in science process skills is partly due to teachers who still do not provide opportunities for children to express their ideas and thoughts variably and originally, so the answers produced by children tend to be the same. Science process skills can be developed through simple experiments.

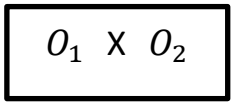
According to Slamet Suyanto (2005), science learning in early childhood is done through simple experimental activities. Experimentation is very suitable for early childhood because they have a high curiosity (El-Sabagh, 2021). Experimental activities provide facilities for children to explore things in the activities. Children can conduct experiments by watering wilted plants. Children can also learn that plants need water to survive through these experimental activities (Wahid & Suyanto, 2015). Simple experiments are learning activities that contain experimental processes where children conduct experiments directly during the experiment activities (Wahyuni & Azizah, 2020). Children conduct experiments on the topics being studied. Through simple experimental activities, children will help to discover the truth about events or concepts they are learning (Susanti, 2013).

Based on the background of the problem above, the researcher conducted a study on "The Influence of Simple Experiments on Science Process Skills of 5-6 Year Olds in Al-Khairat Kalumpang Kindergarten". This study aims (1) to determine the application of simple experimental activities in 5-6 year old children at Al-Khairat Kalumpang Kindergarten, (2) to determine the science process skills of 5-6 year old children at Al-Khairat Kalumpang Kindergarten, (3) to determine the influence of simple experiments on the science process skills of 5-6 year old children at Al-Khairat Kalumpang Kindergarten. Based on the research objectives to be achieved, this research is expected to have benefits in education both directly and indirectly. The theoretical benefits of this research are expected to provide information on how to apply science learning through simple experiments to develop science process skills. Practically, this research can be beneficial for researchers by providing experience and knowledge in conducting research on the influence of simple experiments in science learning for early childhood. For teachers, it can be used as input to improve their skills in conducting simple experiments in science learning to develop science process skills in early childhood. For educational institutions, the results of this research are expected to provide input for educational institutions to improve the quality of science learning through simple experiments.

METHODOLOGY

Types and Research Methods

Basically, research methods are scientific ways to obtain data for specific purposes and uses. This research is quantitative in nature, with the type of research being Pre-Experimental Designs, and the research design using the One Group Pretest-Posttest Design (Nuryanti, R. 2019). This design includes a pretest before the treatment is given. Thus, the treatment results are more accurate because they can be compared with the condition before the treatment. This design can be depicted as follows:



O_1 = Pretest Value (Before Simple Experiment)
O_2 = Posttest Value (After Simple Experiment)

Research Variables

The variables in this study are Simple Experiment as the independent variable (X) and its effect on science process skills as the dependent variable (Y). The independent variable is a variable that influences or causes changes in the dependent variable. (Sugiyono 2013) The dependent variable is a variable that is influenced or caused by the independent variable.

Location and Time of Research

The research was conducted at Al-Khairat Kalumpang Kindergarten, Ternate Tengah District, Ternate City. This research was carried out from June to July 2023.

Population and Sample

The population studied in this research consisted of 20 children at Al-Khairat Kalumpang Kindergarten in Ternate City. The sample in this study was group B1, consisting of 20 children, 11 boys and 9 girls.

Data Collection Technique

The data collection techniques used in this research were observation and documentation (Jailani, M. S. 2023). Observation was conducted using observation sheets/guidelines that had been prepared beforehand. Observations were made by the researcher and teachers during the learning process using observation sheets about children's science process skills. Documentation in this research consisted of daily notes, photos, and videos.

Data Analysis Technique

Data analysis was performed using normality tests and t-tests. Normality test is a test conducted to assess the distribution of data in a group or table to determine if the sample comes from normally distributed data or not (Fadli, 2021). After the normality test, if the data is deemed normally distributed, the Paired Sample T-test is conducted. Hypothesis testing is conducted to determine if there is a significant difference. To make decisions, after analyzing the data, it can be observed that:

a. If the significance > 0.05, then Ho is accepted, and Ha is rejected.
b. If the significance < 0.05, then Ho is rejected, and Ha is accepted.

RESULT AND DISCUSSION

This research began by administering a pretest to determine the initial ability of children in science learning processes before using the simple experiment method. During the pretest, the teacher used methods similar to those previously used, namely storytelling and the use of teaching aids. The results of the classification of scores for

science process skills of children in group B1 at Al-Khairat Kalumpang Kindergarten during the pretest are as follows:

Table 1. Classification Result of KPS Score of Group B1

No	Interval	Kategori	F	Persentase	Fk
1	16,25-20	BSB	0	0%	0
2	12,5-15,25	BSH	0	0%	0
3	8,75-11.5	MB	0	0%	0
4	5-7,75	BB	20	100%	20

The first treatment was conducted on June 6, 2023, inside the classroom of group B1, which consisted of 20 children. Before implementing the first treatment, the researcher aligned perceptions with the teacher regarding the research and explained the form of activities to be carried out. The learning activity in the first treatment involved children from group B1 conducting a simple science experiment on buoyancy with materials and equipment prepared by the teacher and the researcher.

During the straightforward experiment, each child experimented individually and independently. Every child experimenting was guided by the researcher, class teacher, and assistant teacher. The results of the science process skills in the first treatment can be seen in the following table:

Table 2. KPS Results of Group B1 in Experiment 1

No	Nama Anak	Sub Indikator Pengamatan					Skor	Kategori
		1	2	3	4	5		
1	AHA	1	2	1	1	1	6	BB
2	AL	2	2	2	2	1	9	MB
3	AAP	1	1	1	1	2	6	BB
4	AZM	1	2	2	1	1	7	BB
5	AJM	1	2	1	1	1	6	BB
6	AAD	2	1	1	1	2	7	BB
7	AKE	1	1	2	1	2	7	BB
8	DAB	1	2	1	1	2	7	BB
9	IAM	1	2	1	1	1	6	BB
10	IRM	1	2	1	1	2	7	BB
11	LLSS	2	1	1	1	1	6	BB
12	MAS	2	1	1	2	1	7	BB
13	MRPF	1	1	1	2	2	7	BB
14	MAB	1	1	1	2	1	6	BB
15	MAV	1	1	2	1	2	7	BB
16	MKK	2	1	1	1	1	6	BB
17	MTR	1	1	2	1	1	6	BB
18	RAT	1	1	1	2	2	7	BB
19	SON	1	1	2	1	1	6	BB
20	ZND	2	1	2	1	1	7	BB
Total		**26**	**27**	**27**	**25**	**28**	**133**	
Rata-Rata							**6,65**	**BB**

Based on the table above, the highest score obtained is 10 and the lowest score is 5. The science process skills of children are categorized as follows: Not Developed (ND) for 19 children, Beginning to Develop (BD) for 1 child, and there are no children who have developed as expected (ADE). The second treatment was conducted on June 7, 2023, inside the classroom of group B1, which consisted of 20 children. The learning activity in the second treatment involved children from group B1 conducting a simple science experiment on materials that absorb water and materials that do not absorb water, using materials and equipment prepared by the teacher and the researcher. The results of the science process skills in the second treatment can be seen in the following table:

Table 3. KPS Results of Group B1 in Experiment 2

No	Nama Anak	Sub Indikator Pengamatan					Skor	Kategori
		1	2	3	4	5		
1	AHA	2	2	2	1	1	8	BB
2	AL	2	2	2	2	2	10	MB
3	AAP	2	1	1	2	2	8	BB
4	AZM	2	2	2	2	2	10	MB
5	AJM	1	2	2	2	1	8	BB
6	AAD	2	2	2	2	2	10	MB
7	AKE	1	2	2	1	2	8	BB
8	DAB	2	2	1	1	2	8	BB
9	IAM	2	2	1	2	1	8	BB
10	IRM	1	2	1	2	2	8	BB
11	LLSS	2	2	1	2	2	9	MB
12	MAS	2	2	2	2	2	10	MB
13	MRPF	1	2	2	2	2	9	MB
14	MAB	1	1	2	2	2	8	BB
15	MAV	2	1	2	2	2	9	MB
16	MKK	2	1	2	2	1	8	BB
17	MTR	1	2	2	2	1	8	BB
18	RAT	2	2	2	2	2	10	MB
19	SON	1	2	2	2	1	8	BB
20	ZND	2	2	2	2	2	10	MB
Total		**33**	**36**	**35**	**37**	**34**	**175**	
Rata-Rata							**8,75**	**MB**

Based on the table above, the highest score obtained is 10 and the lowest score is 5. The science process skills of children are categorized as follows: Not Developed (ND) for 11 children, Beginning to Develop (BD) for 9 children, and there are no children who have developed as expected (ADE). However, in the second treatment, the science process skills of children showed improvement. The third treatment was conducted on June 8, 2023, inside the classroom of group B1, which consisted of 20

children. The learning activity in the third treatment involved children from group B1 conducting a simple science experiment on substances that dissolve and do not dissolve in water, using materials and equipment prepared by the teacher and the researcher. The results of the science process skills in the third treatment can be seen in the following table:

Table 4. KPS Results of Group B1 in Experiment 3

No	Nama Anak	Sub Indikator Pengamatan					Skor	Kategori
		1	2	3	4	5		
1	AHA	2	2	2	2	2	10	MB
2	AL	2	3	3	3	2	13	BSH
3	AAP	2	2	2	2	2	10	MB
4	AZM	2	3	3	3	2	13	BSH
5	AJM	2	2	2	2	2	10	MB
6	AAD	3	3	2	2	3	13	BSH
7	AKE	2	2	2	2	2	10	MB
8	DAB	2	2	2	2	2	10	MB
9	IAM	2	2	2	3	2	11	MB
10	IRM	2	2	2	2	2	10	MB
11	LLSS	2	2	2	2	2	10	MB
12	MAS	2	3	3	2	2	12	BSH
13	MRPF	2	2	2	2	2	10	MB
14	MAB	2	2	2	2	2	10	MB
15	MAV	2	2	2	2	2	10	MB
16	MKK	2	2	2	2	2	10	MB
17	MTR	2	2	2	2	2	10	MB
18	RAT	3	3	2	2	3	13	BSH
19	SON	2	2	2	2	2	10	MB
20	ZND	3	3	3	2	2	13	BSH
Total		**43**	**46**	**44**	**43**	**42**	**218**	
Rata-Rata							**10,9**	**MB**

Based on the table above, the highest score obtained is 13 and the lowest score is 5. Children's science process skills are categorized as Beginning to Develop (BD) for 14 children, and Developed as Expected (ADE) for 6 children. This indicates that in the third experiment, children who were not yet developing (ND) progressed to beginning to develop (BD) and developed as expected (ADE) in their science process skills.

The posttest activity was conducted after all the experiments were completed. Children were reevaluated to assess the development of their science process skills through the buoyancy experiment. The posttest was conducted through observation during the experiment process, and the posttest data were compared to see the development of children's science process skills before and after being given simple science experiment activities using statistical analysis of the t-test for differences. This t-test was performed to determine the significance of the development of science process skills through simple experiments. The results of the posttest on the science

process skills of children in group B1 at Al-Khairat Kalumpang Kindergarten can be seen in the following table:

Table 5. Posttest Results of Science Process Skills of Group B1 Children

No	Nama Anak	Sub Indikator Pengamatan					Skor	Kategori
		1	2	3	4	5		
1	AHA	3	3	3	3	3	15	BSH
2	AL	3	3	3	3	3	15	BSH
3	AAP	2	2	3	2	2	11	MB
4	AZM	3	3	3	3	3	15	BSH
5	AJM	2	3	2	2	2	11	MB
6	AAD	3	3	3	3	3	15	BSH
7	AKE	3	3	2	3	2	13	BSH
8	DAB	2	3	2	2	2	11	MB
9	IAM	3	3	3	3	2	14	BSH
10	IRM	2	2	2	3	2	11	MB
11	LLSS	2	2	2	3	2	11	MB
12	MAS	3	3	3	3	3	15	BSH
13	MRPF	3	2	3	2	3	13	BSH
14	MAB	3	3	3	2	3	14	BSH
15	MAV	3	2	3	2	3	13	BSH
16	MKK	2	3	3	3	3	14	BSH
17	MTR	3	2	2	2	2	11	MB
18	RAT	3	3	3	3	3	15	BSH
19	SON	2	2	2	3	2	11	MB
20	ZND	3	3	3	3	3	15	BSH
Total		**53**	**53**	**53**	**53**	**51**	**263**	
Rata-Rata							**13,15**	**BSH**

Based on the table above, the highest score obtained is 15 and the lowest score is 5. The science process skills of children are categorized as follows: Beginning to Develop (BD) for 7 children, and Developed as Expected (ADE) for 13 children. This indicates that in the posttest activity, children who were beginning to develop (BD) experienced improvement in their science process skills to developed as expected (ADE). The results of the frequency distribution of posttest science process skills through simple experiments can be seen in the following table:

Table 6. Frequency Distribution of Posttest Science Process Skills for Group B

No	Interval	Kategori	F	Persentase	Fk
1	16,25-20	BSB	0	0%	0
2	12,5-15,25	BSH	13	65%	13
3	8,75-11.5	MB	7	35%	20
4	5-7,75	BB	0	0%	20
Total			20	100%	

Based on the table above, there are 13 children, accounting for 65%, in the Developed as Expected (ADE) category, and 7 children, accounting for 35%, in the Beginning to Develop (BD) category. This indicates that through simple experiment activities, children's science process skills can be developed.

The comparison results of the development of science process skills before the experiment (pretest) and after the experiment (posttest) can be seen in the following table:

Table 7. Comparison Results of Pretest and Posttest Science Process Skills

No	Nama Anak	Pretest		Postest		Selisih
		Skor	Kategori	Skor	Kategori	
1	AHA	5	BB	15	BSH	10
2	AL	7	BB	15	BSH	8
3	AAP	5	BB	11	MB	6
4	AZM	6	BB	15	BSH	9
5	AJM	5	BB	11	MB	6
6	AAD	6	BB	15	BSH	9
7	AKE	6	BB	13	BSH	7
8	DAB	6	BB	11	MB	5
9	IAM	5	BB	14	BSH	9
10	IRM	7	BB	11	MB	4
11	LLSS	5	BB	11	MB	6
12	MAS	7	BB	15	BSH	8
13	MRPF	6	BB	13	BSH	7
14	MAB	5	BB	14	BSH	9
15	MAV	7	BB	13	BSH	6
16	MKK	6	BB	14	BSH	8
17	MTR	6	BB	11	MB	5
18	RAT	7	BB	15	BSH	8
19	SON	5	BB	11	MB	6
20	ZND	7	BB	15	BSH	8
Jumlah		**119**	**BB**	**263**	**BSH**	**144**
Rata-Rata		**5,95**		**13,15**		**7,2**

Based on the table above, there is an increase in the science process skills scores of the children. The average score before treatment (pretest) is 5.96, categorized as Not Developed (ND), while after treatment and posttest, the average score increases to 13.15, categorized as Developed as Expected (ADE). The change in science process skills before and after the simple experiment can be seen in the following graph:

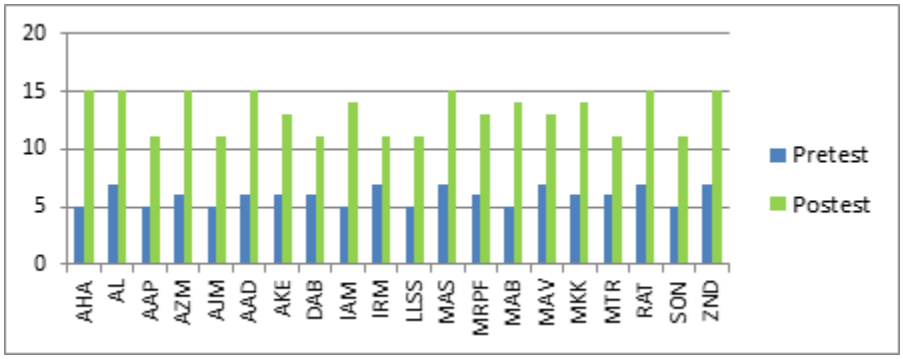


Figure 1. Comparison of Pretest and Posttest Science Process Skills

Before the data is processed for the t-test, it must first be tested for normality. Normality testing is used to determine whether the data from each variable is normally distributed or not. The formula used is the Kolmogorov-Smirnov formula. To determine whether the frequency distribution of each variable is normal or not, the Asymp.Sig. value can be observed. The results of the normality test are presented in the following table:

Table 8. Normality Test Results

One-Sample Kolmogorov-Smirnov Test			
			Unstandardized Residual
N			20
Normal Parameters	Mean		.0000000
	Std. Deviation		.76744400
Most Extreme Differences	Absolute		.129
	Positive		.124
	Negative		-.129
Test Statistic			.129
Asymp. Sig. (2-tailed)			.200
Monte Carlo Sig. (2-tailed)	Sig.		.502
	99% Confidence Interval	Lower Bound	.489
		Upper Bound	.514

The normality test results on the side explain that with the Kolmogorov-Smirnov test, the obtained data is 0.200 = .200 > 0.05. This means that 0.200 is greater than 0.05, indicating that the data is normally distributed. Therefore, it can be concluded that the variable of science process skills in children is normally distributed. The results of the t-test can be seen in the following table:

Table 9. Results of Paired Samples Test

Paired Samples Test					
		t	df	Significance	
				One-Sided p	Two-Sided p
Pair 1	Pretest - Postest	-19.615	19	<,001	<,001

Based on the table above, the calculated t-value is -19.615 with a significant level of 0.001. Since the significance is <0.05, it can be concluded that H_0 is rejected and H_1 is accepted, meaning there is an influence of Simple Experiment on the Science Process Skills of 5-6 Year-Old Children at TK Al-Khairat Kalumpang.

According to the research conducted by the researcher, simple experiments have a significant impact on children's science process skills. Simple science experiment activities were conducted inside the classroom. Before the treatment (simple experiment), overall, the science process skills of children were still low or in the category of Not Developed (ND). However, after being provided with simple experiment activities, the science process skills of children showed development. This can be seen from the posttest results, where 13 children, accounting for 65%, were categorized as Developed as Expected (ADE), and 7 children, accounting for 35%, were categorized as Beginning to Develop (BD).

This research was conducted over 5 meetings and a pretest was conducted as an initial overview of the research implementation at TK Al-Khairat Kalumpang. The results of each stage of the research are as follows: during the pretest (5.95%), after the first treatment (Experiment I) (6.65%), after the second treatment (Experiment II) (8.75%), after the third treatment (Experiment III) (10.9%), and after the posttest (13.5%).

In this study, the stimulated/trained science process skills included: observing, classifying, and communicating. Among these three process skills, some children still lacked confidence and were hesitant to present in front of the class to discuss the science experiments they had conducted. These process skills do not grow and work automatically but need to be trained to grow and develop properly. Through simple science experiment activities, children will experience the scientific process. Thus, it can be said that the children's process skills have developed and improved.

According to Piaget (Suyanto), the cognitive development of children aged 5-6 years old is in transition from the Preoperational stage to the Concrete Operational stage. Concrete thinking is based on experiences with concrete objects, not on knowledge or abstract concepts. At this stage, children learn best through the presence of objects. Therefore, science learning for 5-6 year-old children is not filled with abstract concepts but rather children learn science through direct experiences with concrete objects, namely through simple science experiments.

Moreover, in this research, the simple science experiments conducted were: (1) Buoyancy, (2) Absorption of Water, and (3) Solubility. These simple experiments had a significant impact on the science process skills of children in group B1 at TK Al-Khairat Kalumpang.

CONCLUSION

Based on the research conducted in group B1 at TK Al-Khairat Kalumpang regarding the effect of simple experiments on science process skills, it can be concluded that the implementation of simple experiment activities was conducted through three treatments: Buoyancy experiment, solubility experiment, and absorption of water experiment. The science process skills of 5-6 year-old children at TK Al-Khairat Kalumpang include Observing Skills, Grouping/Classifying Skills, and Communicating Skills. This can be seen from the scores obtained at each stage of the research: pretest (5.95%), first treatment (Experiment I) (6.65%), second treatment (Experiment II) (8.75%), third treatment (Experiment III) (10.9%), and posttest (13.5%). Simple experiments have an impact on the science process skills of children based on the t-value test result of -19.615 with a significance level of 0.001. Since the significance is <0.05, it can be concluded that H0 is rejected and H1 is accepted, meaning there is an effect of simple experiments on the science process skills of 5-6 year-old children at TK Al-Khairat Kalumpang.

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