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# The Effect of Experimental Methods on Science Ability in Children Aged 5-6 Years in Paud Mawar Unpatti, Nusanive District, Ambon City

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**Abstract**

*This study aims to determine the effect of experimental methods on science skills in early childhood at PAUD Mawar UNPATTI, Nusanive District, Ambon City. This research was conducted at PAUD Mawar Unpatti, Nusanive District, Ambon City. Nusanive District, Ambon City, the population in this study was 25 children aged 5-6 years. The sampling in this study was based on the opinion of Sugiyono (2008: 118) the sample is a part of the whole and the characteristics possessed by a population. The sampling method in this study was simple random sampling technique. The samples used in this study were 20 children aged 5-6 from a population of 25 children aged 5-6 years. Data is collected through observation and documentation. The technique used to process and analyze research data is the dependent test. Because the t formula is used, the t formula varies widely and its use is adjusted to the characteristics of the data to be differentiated. There are several requirements that must be fulfilled before the t test is carried out. Research concludes thatFirst. The effect of the lecture method on increasing science learning ability before using the experimental method in children aged 5-6 years at PAUD Mawar UNPATTI, Nusanive District, Ambon City. This is evidenced in the distribution of scientific abilities in preschool children before using the lecture method which is in the range of scores from 0 to 100 and the lowest score is 10, the highest score is 18 with the average value being 15.25.Second.There is an effect of the experimental method on increasing the ability to learn science after using the experimental method in children aged 5-6 years at PAUD Mawar UNPATTI, Nusanive District, Ambon City. This is evidenced by the distribution table of scientific abilities in early childhood children after using the experimental method which is in the range of scores from 0 to 100 and the lowest score is 12, while the highest score is 21, obtained an average of 17.65.Third.Based on the hypothesis test calculation, namely $t_{count} = -105,25 < t_{table} = 2,146$ at $α = 0.05$ and degrees of freedom $n-1 = 20-1 = 19$. Thus it can be concluded that the Alternative hypothesis (H1) is accepted and the hypothesis (Ho) is rejected.*

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## INTRODUCTION

Children are the next generation of the nation and are the foundation and hope of their parents. Children need to be prepared so that one day they become quality human resources and are able to play an active role in national development. Based on RI Law No. 20 of 2003 concerning the National Education System

Chapter I, Article 1, item 14, states that early childhood education is a coaching effort aimed at children from birth to the good old age which is carried out through the provision of educational stimuli to help physical and spiritual growth and development so that children have Readiness
in entering further education.

Early childhood science learning can train and provide opportunities for children to develop process skills and can train children to be able to think and act rationally and critically towards scientific issues that exist in their environment. The skills given to children are as much as possible adapted to the level of age development and characteristics of the children, so that children can apply them in their daily lives.

The experimental method will provide opportunities for children to gain direct and enjoyable learning experiences. Thus encouraging children to be skilled in doing their own experiments. In the process of teaching and learning with the experimental method, children are also given experience to observe an object by themselves. Thus the child is required to experience it for himself, seek the truth, look for the necessary data, obtain the data himself, prove a law and draw conclusions from the process he is experiencing.

Based on the results of observations made at PAUD Mawar UNPATTI, Nusanive District, Ambon City, children's scientific abilities have not fully developed properly. The teacher gives assignments more often so that the learning activities carried out by the teacher are not conducive. The science learning process still uses the lecture method, so that science learning is more dominated by teachers.

Sumaji (Nugraha, 2005: 27) reveals that the fundamental goal of science education is to develop individuals to be literate in the scope of science and to be able to use its fundamental aspects in solving problems which should be aimed at fostering students' understanding, interest and respect for science. the world in which they live.

According to Nugraha (2005:35), the benefits of developing science skills in early childhood children are expected to: 1. Possess basic skills for life needs 2. Possess skills in acquiring, developing and applying science concepts in their lives. 3. Having scientific attitudes and using his approach in solving the life problems he faces. 4. Having an awareness of the order of nature and all the beauty that is around it.

According to Rusyanorang, the notion of experimentation and laboratory work, although these two meanings contain almost the same principles, are different in their connotations. An experiment is an attempt to prove a particular question or hypothesis.

In the learning process with this experimental method students are given the opportunity to experience it themselves or do it themselves, follow the process, observe an object, analyze, prove and draw their own conclusions about an object, state or process of something. Therefore the role of the teacher in providing experimental methods is very important so that there are no mistakes and errors in interpreting experimental activities in the learning and teaching process. From the above opinion, the authors conclude that the experimental method used in this study

is a method in which children are given the opportunity and freedom to conduct experiments with guidance from the teacher. The experimental method helps students to be more involved and active in the activities given by the teacher.

**METHOD**

**Types Of Research**

This research is a quasi-experimental research or (*like an experiment*). Experimental research is one of the quantitative methods, used especially when the researcher wants to conduct an experiment to look for a causal relationship (causal relationship) between two factors that are deliberately caused by the researcher by eliminating, reducing or setting aside other disturbing factors.

**Research Design**

The research design used was one group pretest-posttest design.

**Research Variable**

The variables in this study are as follows:

1. The independent variable in this study is the experimental method. 2. The dependent variable in this study is scientific ability.

**Research Location And Time**

1. This research was conducted at PAUD Mawar Unpatti, Nusanive District, Ambon City. 2. This research was conducted for 1 month. (January 15, 2023-February 15, 2023).

**Population And Sample**

- The population in this study was 25 children aged 5-6 years.
- Sampling in this study was a simple random sampling technique or random sampling through a simple method such as drawing or using a number approach. The sample used in this study were 20 children aged 5-6 years.

**Data Collection Techniques And Data Collection Instruments**

In this study, the data collection techniques were observation and documentation

**Data Analysis Technique**

The data analysis technique used by researchers in this study is the dependent test. Because the t formula is used, there are many variations of the t formula and its use is adjusted to the characteristics of the data to be distinguished. There are several requirements that must be met before the t test is carried out. The requirements are as follows: Normality Test**,** Homogeneity Test, Test test

**Research Results And Discussion**

**The ability of science in children before using the experimental method**

Based on research data to improve science skills in PAUD children before using the experimental method is in the score range of 0 to 100 and the lowest score is 10, the highest score is 18, the average is 15.25 and the median is 12 and the mode is 12.5 for More details can be shown in the following table.

**Table.4.1 Frequency distribution of science abilities in early childhood before using the experimental method**

| No | Interval Class | Absolute Frequency | Relative Frequency |
|---|---|---|---|
| 1 | 10-11 | 3 | 20% |
| 2 | 12-13 | 6 | 40% |
| 3 | 14-15 | 3 | 20% |
| 4 | 16-17 | 3 | 20% |
| 5 | 18-19 | 5 | 40% |
| 6 | 20-21 | 0 | 0 |
| Amount | | **20** | **100%** |

Based on the calculations listed in the table, it is known that the children who obtained the greatest learning scores between 12-13 and 18-19, namely 11 children (40%), who obtained scores below the average were 9 children (60%).

**Picture. 1. Histogram Children's scientific abilities before using the experimental method**
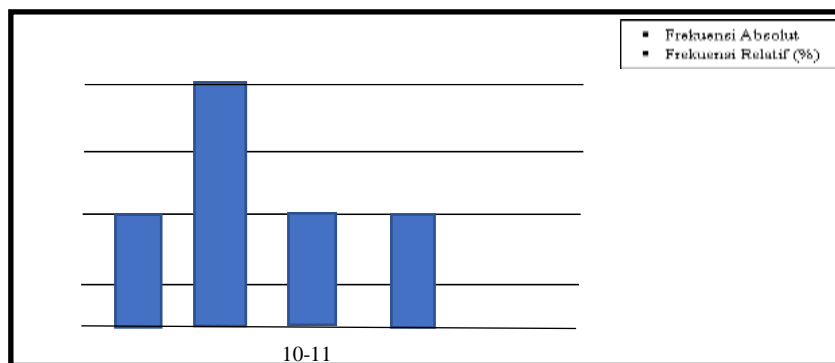


**Children's scientific ability after using the experimental method**

Based on research data for science learning outcomes scores in children after using the experimental method are in the range of scores from 0 to 100 and the lowest score is 13, while the highest score is 20, obtained from the average is 16.67, while the median is 17 and the mode is 17 ,07.

**Table 2 Frequency distribution of scientific abilities after using the experimental method**

| No | Interval Class | Absolute Frequency | Relative Frequency |
|---|---|---|---|
| 1 | 13-14 | 4 | 27,67 % |
| 2 | 15-16 | 1 | 7,8 % |
| 3 | 17-18 | 6 | 50 % |
| 4 | 19-20 | 6 | 50 % |
| 5 | 21-22 | 0 | 0 |
| Amount | | **20** | **100%** |

Based on the calculations listed in the table, it is known that the students who obtained the greatest results were between 17-20 (50%), who obtained an average score of 12 children (24.35%) and who obtained scores above the average of 4 children (27.67%).

**Picture. 2 Histogram of children's scientific abilities after using the experimental method**
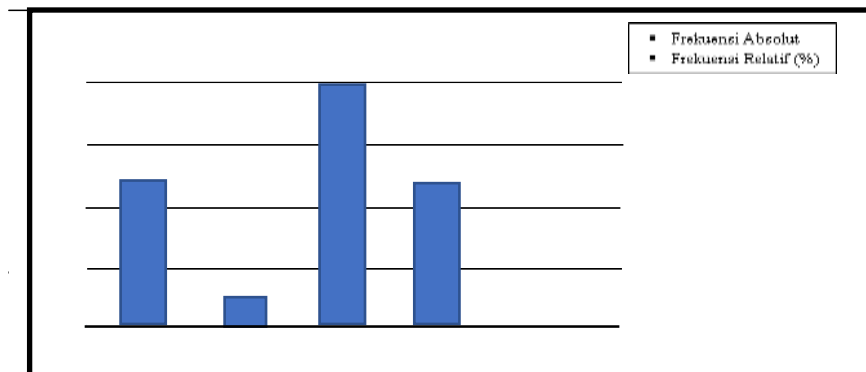


**Testing data analysis requirements**

The normality test in this study was carried out using the Liliefors test, with a significant level of α = 0.05. Testing using the normality test obtained the value of Lcount <Ltable. Thus the sample and population have a normal distribution.

**Test for normality before using the experimental method**
**Table 3 calculation of the normality test before using the experimental method**

| No | X | F | fkum | Day | F (Zi) | S (Zi) | F(Zi)–S(Zi) |
|----|----|----|----|----|----|----|----|
| 1 | 10 | 3 | 3 | -1.411255411 | 0.079084658 | 0.066666667 | 0.012427984 |
| 2 | 12 | 2 | 5 | -0.545454545 | 0.292720467 | 0.266666667 | 0.036053486 |
| 3 | 13 | 4 | 9 | -0.112554113 | 0.455192033 | 0.4 | 0.055293134 |
| 4 | 14 | 2 | 11 | 0.32034632 | 0.625647093 | 0.666666667 | -0.051029575 |
| 5 | 15 | 1 | 12 | 0.753246753 | 0.774349175 | 0.8 | -0.026651826 |
| 6 | 16 | 1 | 13 | 1.186147186 | 0.882217911 | 0.866666667 | 0.015452246 |
| 7 | 17 | 2 | 15 | 1.619047619 | 0.947281491 | 0.933333333 | 0.013948158 |
| 8 | 18 | 2 | 16 | 1.183147686 | 0.863217915 | 0.866666667 | 0.015152347 |
| 9 | 19 | 1 | 17 | 1.519147623 | 0.348283391 | 0.933333333 | 0.015938156 |
| 10 | 20 | | 2 | 18 | 1.183137589 | 0.835217815 | 0.866666667 | 0.035131346 |
| | | | | | | count | 0.055293134 |
| | | | | | | Ltabel | 0.220 |

The table above shows that the calculation of the normality test before using the experimental method Lcount is 0.055192033 and Ltable = 0.220 from the

Liliefors test list with criteria α = 0.05. Because Lcount < Ltable, the class data after using the experimental method is declared normal distribution

**Normality test after using the experimental method**

**Table. 4. the calculation of the normality test after using the experimental method**

| No | X | F | fkum | | S (Zi) | F(Zi)–S(Zi) |
|----|-----|---|------|--|-------------|---------------|
| 1 | 13 | 3 | 3 | | 0.066666667 | -0.004619755 |
| 2 | 14 | 1 | 4 | | 0.266666667 | -0.134807786 |
| 3 | 16 | 1 | 5 | | 0.333333333 | 0.057437353 |
| 4 | 17 | 4 | 9 | | 0.4 | .357738496 |
| 5 | 18 | 2 | 11 | | 0.666666667 | 0.046624475 |
| 6 | 19 | 3 | 14 | | 0.8 | 0.037243839 |
| 7 | 20 | 1 | 15 | | 1 | -0.080254557 |
| 8 | 21 | 1 | 13 | | 0.866666667 | 0.035252345 |
| 9 | 22 | 1 | 12 | | 0.866666667 | 0.0351231546 |
| | | | **count** | | | 0.357738496 |
| | | | **Ltabel** | | | 0.220 |

The table above shows that the calculation the normality test after using the experimental method Lcount is equal to**0.357738496** and Ltable = 0.220 from the liliefors test list with criteria α = 0.05. Because Lcount < Ltable, the class data before using the experimental method is declared normal distribution.

**Homogeneity test for pretest and posttest**

Homogeneity test is carried out to find out whether the samples come from the same variance or are homogeneous. From the calculations in Appendix 6, the homogeneity test can be obtained as follows:

$$Fcount = \frac{S1^2}{S2^2}$$

$$Fcount = \frac{189^2}{261^2}$$

$$Fcount = \frac{38.618}{63.400}$$

$$Fcount = 0{,}732726$$

Then consult the value of the F distribution table at the significant level α = 0.05. From the calculation above, the value of F is obtained$_{count}$ sebesar 0,732726 Dan $F_{table}$ of 1.76251. because $F_{count} < F_{table}$ namely 0.732726 < 1.66141, it can be concluded that the data from both samples for the pretest and posttest were homogeneous or the samples came from the same variance.

**Hypothesis testing**

After testing the requirements for normality and homogeneity of the data, then testing the research hypothesis will be carried out. The hypothesis in this study is that there is only 1 (one) hypothesis to be tested where only one is to find out whether or not there is an influence on increasing science learning in early childhood before and after using the experimental method. Statistically it can be formulated as follows:

$HO = \mu 1 = \mu 2$

$Ha= m_1 {}_< m_2$

Differences in the average increase in science ability in early childhood before and after using the experimental method were analyzed using the dependent t test (in Appendix 1). From the results obtained tcount = $-105.25 < t_{table} = 2.146$ at $\alpha = 0.05$ and degrees of freedom n-1 = 14 then the null hypothesis (Ho) is rejected and the alternative hypothesis (Ha) is accepted. Thus there is a significant difference in the average scientific ability before and after using the experimental method in children aged 5-6 years at PAUD Mawar UNPATTI, Nusanive District, Ambon City.

**DISCUSSION**

From the results of observation and learning using the lecture method, the children obtained an average score of 13.26 with a score range of 0-100. Then the class is given a different learning, namely by using the experimental method, after that the examiner makes observations to find out the final development (posttest). experimental method, the average child's result is 19.

Based on the data obtained from the results of hypothesis testing where $t_{count} < t_{table}$ ie $t_{count} = -38.618 < t_{table} = 2.145$ at $\alpha = 0.05$ and degrees of freedom n-1 = 20-1 = 19. Thus it can be seen that the scientific ability of children using the experimental method is affected compared to children who are only taught by the lecture method.

Thus the results of this study conclude that in order to improve science skills in early childhood, teachers need to apply interesting and good learning so that children are motivated to learn.

**CONCLUSION**

1) The effect of the lecture method on increasing science learning ability before using the experimental method in children aged 5-6 years at PAUD Mawar UNPATTI, Nusanive District, Ambon City. This is evidenced in the distribution of scientific abilities in preschool children before using the lecture method which is in the range of scores from 0 to 100 and the lowest score is 10, the highest score is 18 with the average value being 15.25.

2) There is an effect of the experimental method on increasing the ability to learn science after using the experimental method in children aged 5-6 years at PAUD Mawar UNPATTI, Nusanive District, Ambon City. This is evidenced by the distribution table of scientific abilities in early childhood

children after using the experimental method which is in the range of scores from 0 to 100 and the lowest score is 12, while the highest score is 21, obtained an average of 17.65

3) Based on the hypothesis test calculation, namely $t_{count} = -105,25 < t_{table} = 2,146$ at $\alpha = 0.05$ and degrees of freedom n-1 = 20-1 = 19. Thus it can be concluded that the Alternative hypothesis (H1) is accepted and the hypothesis (Ho) is rejected.

**SUGGESTION**
1) It is recommended for school principals to be able to provide facilities that can support the improvement of children's science abilities, provide learning media that are interesting and also safe to use such as experimental methods so that children's scientific abilities are increasing.
2) For teachers, it is hoped that they can choose a more effective learning model so that children's learning abilities are also better. The experimental method can also be used as an alternative in providing variations in the learning process.

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