The Effectiveness of Scientific Learning Model Based on Local Wisdom of Kendal Batik on Learning Ability of Early Childhood Students

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Abstract

The implementation of the traditional learning model has proven to be not optimal in terms of knowledge transfer that is able to be absorbed by children in the first fifteen minutes of learning, compared to absorbing contextual understanding that relates it to the real world. This does not support children to be able to think critically, analytically, and precisely in identifying, understanding, solving problems, and applying substance or learning material. Therefore the need for an appropriate learning development model for child development. This research is research and development which is designed to find the right model product findings to be used practically in the field of education. The research method consists of four stages: define, design, develop and disseminate. Data analysis techniques used descriptive statistics and the N-Gain test. Data validity techniques include quantitative data and qualitative data using concurrent triangulation at the same time. The two data are then compared to find out whether there is convergence, difference or combination. The conclusion from the results of this study is that the scientific learning model is appropriate for use in learning in Kindergarten B at PKG Markisa Kendal. An effective scientific learning model can improve the cognitive abilities of early childhood in Kindergarten B at PKG Markisa Kendal. This is based on the results of product trials that the experimental class using the center model is better than the control class using conventional learning models.

Keywords: *Effectiveness, Scientific Learning Model, Local Wisdom, Kendal Batik*

INTRODUCTION

The learning process of children should be carried out in direct activities in real experience so that basic concepts are internalized which will give meaning and complete the curiosity of Early Childhood. Early childhood is a person who really needs maximum stimulation in learning for the process of growth and development (Nur Hakim & Rahayu, 2019). The learning process positions the teacher not only as a companion but also as a guide and facilitator for children. Humans experience different sensitive periods as they grow and develop as children individually (Dini, 2021; Talu et al., 2021). Early childhood is the right time to lay the foundation in stimulating various early childhood development potentials, both religious and moral values, cognitive, language, motoric, and social-emotional (Marwiyati, 2021).

Early childhood learning in principle is playing while learning, learning while playing (Kurniawati et al., 2021). Playing can develop all aspects of children's abilities including children's thinking skills which can support their cognitive development. Through play children get a lot of

practice, can generate curiosity, observe and compare and so on. The main goal in early childhood education is generally to form quality children, namely children who grow and develop according to their level of ability so that they have optimal readiness to enter basic education and navigate life in adulthood. Thus preschool education can help in developing all potential intelligence and aspects of children's abilities more optimally, one of which is children's cognitive abilities (Sari et al., 2016).

There are four principles that need to be considered in implementing activities/learning in children's education institutions. First, it is oriented towards child development. In carrying out activities educators need to align between activities with the stages of child development. Children are unique individuals, so it is necessary to pay attention to their differences personally. The activities prepared must pay attention to the type of child's learning. The two things that need to be considered by educators in the implementation of early childhood activities are activity orientation. The activity orientation is on what the child needs. Optimizing all aspects of their development with various types of learning activities based on the development and needs of individual children. Third , the implementation of learning activities in Early Childhood Education Programs os the principle of playing while learning or learning while playing. Learning activities in Early Childhood Education Programs should be fun with learning strategies, appropriate methods, appropriate materials with media and tools that attract children. Fourth, stimulation of aspects of child development is carried out in an integrated, progressive and continuous manner, where the progress of one aspect of development will affect other developments.

In the implementation of the traditional learning model, it is proven that only ten percent of knowledge transfer is able to be absorbed by children in the first fifteen minutes of learning, while the absorption of contextual understanding that relates it to the real world is only 25% (Suryana, 2017). This does not support children to be able to think critically, analytically, and precisely in identifying, understanding, solving problems, and applying substance or learning material. Therefore the need for an appropriate learning development model for child development. In order to implement quality education, the government has designed a scientific approach. The scientific approach is a new formulation or method that is applied in the realm of national education. The scientific approach (scientific) is also known as the scientific approach. The scientific approach is believed to be a strategic way to develop students' attitudes, skills and knowledge. Nurâ et al. (2023) argues that the scientific approach is a learning process that is designed in such a way, so that students actively construct concepts, laws, or principles through the stages of observing, asking, trying, analyzing, and communicating.

The learning model is an example of a form of learning, which describes the PBM model from the beginning to the end of the learning activity. In determining the appropriate learning model, one must look at the expected Basic Competencies and Core Competencies. First, KI from the 2013 Early Childhood Education Programs Curriculum is an illustration of the achievement of early childhood development at the end of Early Childhood Education Programs services. Second, the suitability of the learning model with the characteristics of KD which is the level of ability that must be achieved in the context of learning content, learning themes, and learning experiences that refer to KI. Must be able to develop knowledge, social and skill competencies, and suitability of learning materials with the demands of K1-2, K1-3 and K1-4 to develop knowledge and skill competencies. Third, the implementation of a scientific approach.

Learning based on culture and local wisdom of an area is a local context that can be developed in an integrated manner in the teaching and learning process of early childhood (Suryana, 2017). In regional culture there are elements or values from education, culture and personal culture of the area that are integrated (Astuti, 2016). In Minangkabau Natural Culture there are characteristics in behaving such as making small talk, polite behavior, raso jo pareso, and patatah patatih which are good values to socialize and pass on to future generations. The values contained in the local culture when integrated into learning will be able to optimize children's development. early childhood education is the right time to instill local cultural values as an effort to optimally implement the 2013 Early Childhood Education Programs curriculum (Suryana, 2017; Sari et al, 2016). In this research a scientific learning model developed and implemented based on local wisdom in the form of Batik Culture for the cognitive and character development of children aged 5-6 years.

So that the culture that is a wisdom towards nature does not become extinct, it is important to preserve these noble values. Noble values need to be instilled and disseminated to students through the learning process (Khoiriyah & Husamah, 2018). So far, the learning process in schools pays little attention to the local culture that develops in the existing community, due to the limitations of teachers in linking concepts, processes and contexts. As a result, students' understanding of natural phenomena becomes meaningless (Ulger, 2018; Purba et al., 2017; Thomas, 2009). Meaningful learning is obtained by students naturally through experiences that they do themselves. Education in schools should create a more meaningful learning atmosphere, not only learning rote theory, but how to get students to create their own learning experiences that they naturally get for themselves. Education in schools describes more about the development of science and technology, not about education oriented towards nature and the environment.

Learning based on culture and local wisdom of an area is a local context that can be developed in an integrated manner in the teaching and learning process of early childhood (Sugiyo & Purwastuti, 2017). In regional culture there are elements or values from education, culture and personal culture of the area that are integrated (Atmojo, 2015). The values contained in the local culture when integrated into learning will be able to optimize children's cognitive development (Dwianto et al., 2017). Early childhood education is the right time to instill local cultural values as an effort to optimally implement the 2013 Early Childhood Education Programs curriculum.

In addition, character education is an important tool for the Indonesian people in dealing with global society in an era of openness (Nurcahyanti, 2019). It is feared that the easier access to information about foreign cultural values will affect Indonesian original behavior and culture (Kurnia & Windarti, 2019). Local wisdom and national character values must be taught intensively through the right academic approach (Purwoko et al., 2019). One educational approach that can be used is a scientific approach.

The scientific approach is carried out to provide understanding to students in knowing, understanding, and practicing various materials using a scientific approach (Tisza et al., 2020; Fleer et al., 2015). The scientific approach emphasizes that information can come from anywhere, at any time, and does not depend on unidirectional information from the teacher (Kähler et al., 2020). To welcome the success of a scientific approach in character education based on local wisdom, synergy between schools, families and the community is needed (Tekercı & Kandır, 2017). Character education based on local wisdom will provide a new understanding, that the success of national education is not only proven by the achievement of values, but national education will form a generation with character based on the nation's noble values (Priyatna, 2016).

To welcome the success of a scientific approach in character education based on local wisdom, synergy between schools, families and the community is needed (Saihu, 2019). Character education based on local wisdom will provide a new understanding, that the success of national education is not only proven by the achievement of values, but national education will form a generation with character based on the nation's noble values (Rukiyati & Purwastuti, 2016). Local wisdom values must be explored and reintroduced to the younger generation in the constellation of national education. Local wisdom can be taught through the application of character education in schools with a scientific approach (Damayanti et al., 2024).

Phenomena in the field as a result of observations/observations as well as teacher performance assessments in semester I of the 2021/2022 academic year conducted by researchers through exploratory studies, especially in Kindergarten B Muslimat NU 03 Kendal, show that Early Childhood Education Programs educators do not understand scientific learning in introducing culture and for cognitive development children aged 5-6 as the implementation of the 2013 Curriculum. This proves that teachers do not understand the use of learning models that are in accordance with the 2013 curriculum so that learning tends to be teacher-oriented and makes children passive. Learning designed by the teacher, especially about local wisdom/culture, is carried out using the lecture method without giving examples in everyday life so that children find it difficult to apply and even forget. Learning that has been implemented has not given children the opportunity to explore or tends to be passive so efforts to optimize children's growth and development are not carried out properly, especially cognitive development with attitudes/actions that are culturally appropriate.

METHODS

This study uses a research and development model known as Research and Development (R&D). The stages of developing learning tools in this study are the Define Stage, the Design Stage and the Develop Stage. Data collection techniques using the Observation Method, Interview Method, Documentation Method, Literature Study and Test Method. The data collection instrument used Test Instruments and Non-Test Instruments (Expert Validation Sheets, Interview Guidelines). Data validation techniques include Instrument Testing Analysis, Learning Device Validity, Validity of Trial Test Items, Reliability of Trial Items, Difficulty Level of Trial Items and Difference Power. Data analysis techniques in this research include quantitative data and qualitative data.

RESULTS

The effectiveness of a scientific learning model containing the local wisdom of Kendal batik to improve the cognitive abilities of early childhood Kindergarten B at PKG Markisa Kendal will be explained based on the results of the pretest and posttest values of Cognitive Development for Kindergarten B Children at PKG Markisa Kendal and based on statistical tests as follows.

Pretest & Posttest Cognitive Development of Kindergarten B Children at PKG Markisa Kendal

After the product is finished and has passed the process of due diligence and product revision, then the developed model is tested in learning practice. This is intended to determine the effectiveness of the model in improving the cognitive and language abilities of early childhood. The criteria for children's cognitive abilities can be seen in Table 1. The pretest and posttest values are in the form of tests to determine children's cognitive abilities and observations to determine learning activities.

Table 1. Criteria for Children's Cognitive Ability

Value Intervals	Criteria
0 - 44	BB (Not Growing)
46 - 64	MB (Start Growing)
65 - 84	BSH (Growing as Expected)
85 - 100	BSB (Very Well Developed)

Kindergarten Muslimat NU 01 Pegandon Kendal

Kindergarten Muslimat NU 01 Pegandon Kendal, in this study was the experimental class 1, where the experimental class 1 was the class subjected to learning actions using the development of a scientific center learning model assisted by the local wisdom of Kendal batik. The results of the pretest and posttest of children's cognitive abilities in Kindergarten Muslimat NU 01 Pegandon Kendal can be described based on statistical calculations using the SPSS for windows 24 program as shows in Table 2.

Table 2. Descriptive Statistical Cognitive Ability of Kindergarten Muslimat NU 01 Pegandon Kendal

	N	Minimum	Maximum	Mean	Std. Deviation
Pre_Experiment1	10	40	60	50.00	6.236
Post_Experiment1	10	80	100	86.00	6.146
Valid N (listwise)	10				

The results of the cognitive abilities of early childhood at Muslimat NU 01 Pegandon Kendal Kindergarten before and after using the development of a scientific learning model containing the local wisdom of Kendal batik. Figure 1 explains that before using the development of a scientific learning model assisted by the local wisdom of Kendal batik, the children's cognitive abilities were in the developing category, then after using the scientific learning model development, the children's cognitive abilities were in the very well-developed category. These results prove that the scientific

learning model assisted by the local wisdom of Kendal batik to improve children's cognitive abilities is appropriate for use in learning. This is based on the cognitive abilities of children who have increased after using scientific learning development assisted by the local wisdom of Kendal batik.

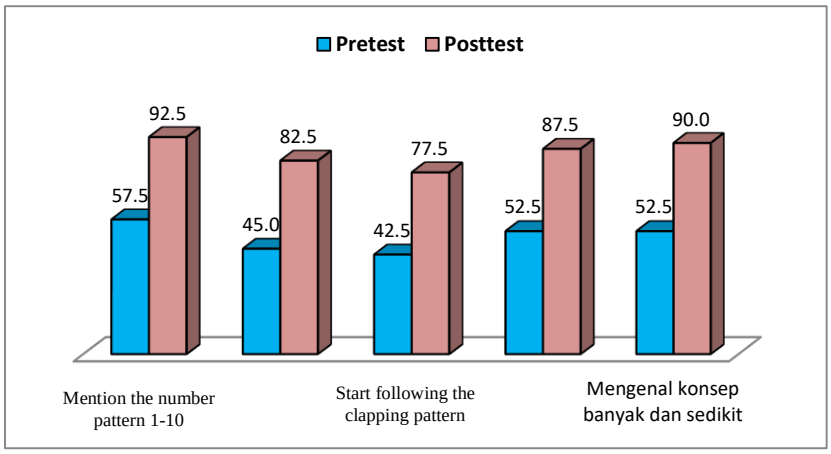

Figure 1. Histogram of Cognitive Ability of Children 3-4 years at Muslimat NU Kindergarten 01 Pegandon Kendal

Kindergarten Muslimat NU 02 Pegandon Kendal

Kindergarten Muslimat NU 02 Pegandon Kendal, in this study was the experimental class 2, where the experimental class 2 was the class subjected to learning actions using the development of a scientific learning model assisted by the local wisdom of Kendal batik. The pretest and posttest results of children's cognitive abilities at Kindergarten Muslimat NU 02 Pegandon Kendal can be described based on statistical calculations using the SPSS for Windows 24 program as shows in Table 3.

Table 3. Deskriptive Statistical Cognitive Ability of Kindergarten Muslimat NU 02 Pegandon Kendal

	N	Minimum	Maximum	Mean	Std. Deviation
Pre_Experiment2	12	40	60	50.42	6.201
Post_Experiment2	12	80	95	86.25	4.827
Valid N (listwise)	12				

The results of the cognitive abilities of children aged Kindergarten NU Muslimat 02 Pegadon Kendal before and after using the development of a scientific learning model. Figure 2 explains that before using the development of scientific learning assisted by the local wisdom of Kendal batik, the children's cognitive abilities are in the developing category, then after using the development of scientific learning models, the children's cognitive abilities are in the very well-developed category. These results prove that the development of scientific learning containing the local wisdom of Batik Kendal is suitable for use in learning. This is based on children's cognitive abilities which increase after using the development of scientific learning models.

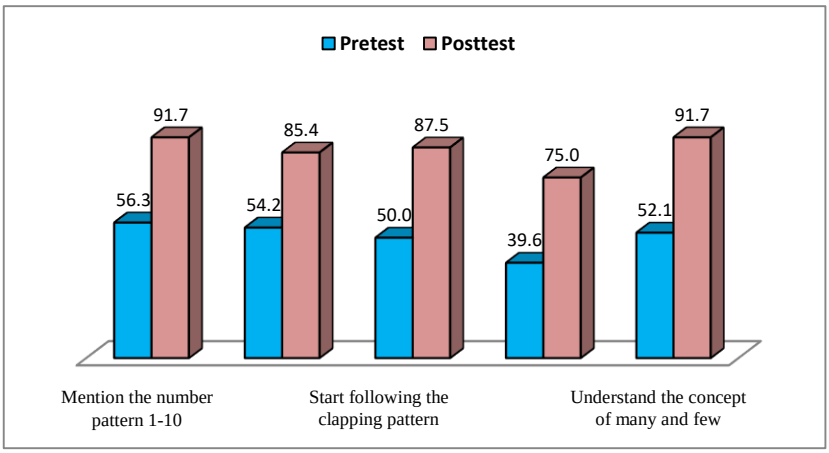

Figure 2. Histogram of Children's Cognitive Ability in Kindergarten NU Muslimat 02 Pegadon Kendal

Kindergarten Muslimat NU 03 Pegandon Kendal

Kindergarten Muslimat NU 03 Pegandon Kendal, in this study is the control class, where the control class is the class that conducts learning on the theme "my needs" but without using the development of scientific learning models. The results of the pretest and posttest of children's cognitive abilities in Kindergarten Muslimat NU 03 Pegandon Kendal can be described based on statistical calculations using the spss for windows 24 program Table 4. Figure 3 shows the results of the control class posttest, then compared with the experimental class posttest, a histogram of the cognitive abilities of children at PKG Markisa Kendal.

Table 4. Descriptive Statistics of Children's Cognitive Ability Kindergarten Muslimat NU 03 Pegandon Kendal

	N	Minimum	Maximum	Mean	Std. Deviation
Pre_Control	11	45	60	50.45	5.222
Post_Control	11	55	70	64.09	4.908
Valid N (listwise)	11				

Figure 3 explains that the development of scientific learning to improve children's cognitive abilities is appropriate for use in learning. This is based on the cognitive abilities of children who receive learning using scientific learning development containing local wisdom of Batik Kendal have better cognitive abilities compared to children who receive learning without using scientific learning models.

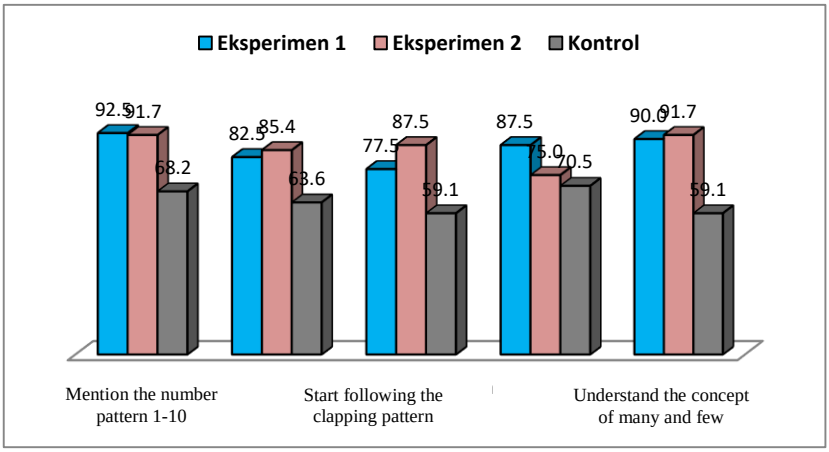

Figure 3. Histogram of Cognitive Ability in PKG Markisa Kendal

Normality Test

The normality test is used to determine whether the data to be analyzed is normally distributed or not. A data that is normally distributed if the amount of data above and below the average is the same, as well as the standard deviation. In this study, the normality test used the chi-square or chi-square formula, after being compared, the next step was to make a decision with the following conditions.

Table 5. Normality Test

	Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Children's Cognitive Abilities	Pretest Experiment 1	0.189	10	0.200	0.940	10	0.550
	posttest Experiment 1	0.265	10	0.076	0.841	10	0.075
	Pretest Experiment 2	0.223	12	0.101	0.903	12	0.172
	Posttest Experiment 2	0.198	12	0.200	0.894	12	0.134
	Pretest Control	0.216	11	0.162	0.871	11	0.079
	Posttest Control	0.210	11	0.191	0.896	11	0.165

a. Lilliefors Significance Correction

The results of the normality test for the pretest and posttest results of the children's cognitive abilities in the table above show that the significance value is greater than the 5% or 0.05 significance level so that it can be concluded that the data is normally distributed. This normality assumption is necessary because if normality is not met, the decision to test the hypothesis (t-test) obtained becomes invalid.

Homogeneity Test

Homogeneity test is used to measure whether the two classes come from a homogeneous population. The homogeneity test in this study serves to see the homogeneity of the control class and the experimental class, which means that the abilities of all children are the same. Data from the results of the calculation of the homogeneity test of the two classes, both experimental and control, obtained the results as presented in Table 6.

Table 6. Homogeneity Test Result

		Levene Statistic	df1	df2	Sig.
Children's Cognitive Abilities	Based on Mean	0.084	2	30	0.920
	Based on Median	0.027	2	30	0.973
	Based on Median and with adjusted df	0.027	2	26.203	0.973
	Based on trimmed mean	0.040	2	30	0.961

Based on the output results of SPSS version 24.0 it is known that the results of the significance value (sig) based on mean is 0.920 > 0.05 at the 5% level so that it can be concluded that the abilities of the children in the experimental and control classes are the same or homogeneous. Thus, the requirements of the paired sample t test are met.

Paired Sampel t-test

After the results of the pretest and posttest found that the data were normally distributed and homogeneous, then a paired-samples t test was carried out to find out whether the average cognitive ability of the child after using the development of a scientific learning model containing local wisdom of Batik Kendal before using the development of the learning model. The results of the paired-samples t test can be seen in the following table.

Table 6. Paired Samples T Test Children's Cognitive Ability

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre - Post_Experiment1	36.000	9.944	3.145	43.114	28.886	11.448	9	.000
Pre - Post_ Experiment2	35.833	5.967	1.723	39.625	32.042	20.803	11	.000
Pre - Post_Control	13.636	8.970	2.704	19.662	7.610	5.042	10	.001

The experimental class 1 at TK NU Muslimat 01 Pegandon Kendal obtained a Sig. (2-tailed) of 0.000 <0.05, or Tcount 11.448 > Ttable 226216, it can be interpreted that there is a difference in the average cognitive abilities of children before and after using the development of a scientific learning model containing the local wisdom of Kendal Batik. Thus, it can be concluded that the development of a scientific learning model containing the local wisdom of Kendal batik can improve the cognitive abilities of children in Kindergarten NU Muslimat 01 Pegadon Kendal.

Experimental Class 2 at the Ngalap Berkah Betokan KB obtained a Sig. (2-tailed) of 0.000 <0.05 or Tcount 20.803 > Ttable 2.20099, it means that there is a difference in the average cognitive abilities of children before and after using the development of scientific learning models. Thus, it can be concluded that the development of a scientific learning model containing the local wisdom of Kendal batik can improve the cognitive abilities of children in Kindergarten NU Muslimat 02 Pegadon Kendal.

Then to strengthen the research results whether there is effectiveness of the center-based learning model again on improving children's cognitive abilities. So the next step is to compare the means or average values in the pretest and posttest in both the experimental class and the control class in the results of the paired samples statistics as shows in Table 7.

Table 7. Paired Samples Statistic Children's Cognitive Ability

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre-Experiment1	50.00	10	6.236	1.972
	Post-Experiment 1	86.00	10	6.146	1.944
Pair 2	Pre-Experiment 2	50.42	12	6.201	1.790
	Post-Experiment 2	86.25	12	4.827	1.393
Pair 3	Pre-Control	50.45	11	5.222	1.575
	Post-Control	64.09	11	4.908	1.480

Based on the results of paired samples statistics, it is known that the cognitive abilities of the experimental class children are learning by using the development of a scientific learning model containing the local wisdom of Batik Kendal. of 86.25. These results can be interpreted that the average value of the cognitive abilities of children from the experimental class in both Muslimat NU 01 Kindergarten and Muslimat NU 02 Kindergarten which both carry out learning using the development of scientific learning models containing local wisdom of Kendal batik, have relatively the same cognitive abilities

Meanwhile, when compared with the average value of children's cognitive abilities in the control class, namely learning without using the development of scientific learning models at Muslimat NU Kindergarten 03 Pegandon Kendal, it obtained a posttest score of 64.09. These results are lower than the posttest value of the experimental class. So, it can be said that children who use scientific learning models have better cognitive abilities compared to children who do not use scientific learning models. In other words, the development of an effective scientific learning model can improve the cognitive abilities of early childhood.

DISCUSSION

Experiment 1 class at Muslimat NU 01 Pegandon Kendal Kindergarten obtained a Sig. (2-tailed) of 0.000 <0.05, or Tcount 11.448 > Ttable 226216, it can be interpreted that there is a difference in the average cognitive ability of children before and after using a scientific learning model containing the local wisdom of Kendal batik. Thus, it can be concluded that the development of a scientific learning model containing the local wisdom of Kendal batik is effective in improving the cognitive abilities of children in Kindergarten Muslimat NU 01 Pegandon Kendal.

Experiment 2 class at TK Muslimat NU 02, Pegandon Kendal obtained a Sig. (2-tailed) of 0.000 <0.05 or t-count 20.803 > t-table 2.20099, it can be interpreted that there is a difference in the average cognitive abilities of children before and after using the development of scientific learning models. Thus, it can be concluded that the development of a scientific learning model containing the local wisdom of Kendal batik is effective in improving the cognitive abilities of children in Kindergarten Muslimat NU 02 Pegandon Kendal.

Based on the results of the paired samples statistic, it is known that the cognitive abilities of the Experiment class children are learning by using the development of scientific learning models, at the Muslimat NU 01 Pegandon Kendal Kindergarten obtaining a posttest score of 86.0 and the posttest score at Muslimat NU 02 Pegandon Kendal Kindergarten of 86.25. These results can be interpreted that the average value of the cognitive abilities of children from the experimental class both at the Muslimat NU 01 Pegandon Kendal Kindergarten and at the Muslimat NU 02 Pegandon Kendal Kindergarten which both carry out learning using the development of scientific learning models, have relatively the same cognitive abilities.

Meanwhile, when compared with the average value of children's cognitive abilities in the control class, namely learning without using the development of a scientific learning model containing the local wisdom of Kendal batik at Muslimat NU Kindergarten 03 Pegandon Kendal, it obtained a posttest score of 64.09. These results are lower than the posttest value of the experimental class. So, it can be said that children who are given learning using the development of scientific learning models have better cognitive abilities compared to children who are not given learning using the development of scientific learning models. In other words, the development of scientific learning models in improving the cognitive abilities of early childhood.

The results of this study indicate that an effective scientific learning model can be used to improve the cognitive abilities of early childhood in Muslimat NU 01 and 02 Pegandon Kendal Kindergarten in line with the results of the study concluded that scientific learning is able to stimulate children's creativity because children are more independent, confident, dare to argue, and high curiosity as creative traits (Witarsa & Dista, 2019).

Likewise with further research, research (Muqodas, 2015) argues that a scientific approach is learning that aims to activate and foster student creativity, so as to shape student creativity, learning with a scientific approach is believed to be able to help improve it. This research is different from previous research, although there are some that discuss scientific learning but have not fully focused on learning in early childhood which involves local wisdom and early childhood cognitive development, for this reason it is necessary to conduct research on how to apply scientific learning based on local wisdom in schools. Early Childhood Education Programs and analyze scientific skills that have been carried out by early childhood education teachers in an effort to develop early childhood cognitive development.

Pesurnay (2018) and Abbas (2013) argue that adding local wisdom values of national culture in each learning process is done so that children have positive or good attitudes from their culture. The 2013 curriculum for early childhood education, which is currently being implemented, provides ample opportunities to explore various local wisdoms from an area. Early childhood educators must be creative in identifying, analyzing, collaborating, designing and integrating local wisdom in the child's environment into learning that is fun and stimulates children's development, including in managing the child's learning environment.

CONCLUSION

Based on the description of the background of the problem and the results of the research above, the following conclusions can be drawn: The scientific learning model can effectively improve the cognitive abilities of early childhood in Kindergarten B at PKG Markisa Kendal. This is based on the results of product trials that the experimental class using the center model is better than the control class using conventional learning models. Based on the results of Experiment 1 class, the value of Sig. (2-tailed) of 0.000 <0.05, or Tcount 11.448 > Ttable 226216 and experimental class 2 Sig. (2-tailed) of 0.000 <0.05 or Tcount 20.803 > Ttable 2.20099.

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