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Development of a Simple Experiment-Based Inquiry Learning Model in Introduction to Science

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Abstract

This research is motivated by the lack of optimal inquiry science learning in children. it is often found that understanding of science in children is less developed due to a lack of motivation and activeness of children in solving problems during the learning process. In learning the 2013 curriculum teaching and learning activities prioritize the development of knowledge, attitudes and skills in children. In teaching and learning activities in PAUD, teachers usually only emphasize reading, writing, and arithmetic. With the application of inquiry science, it is certain to produce a generation of quality resources. This study aims to determine the ability of inquiry science in Hidayatulloh Lidah Kulon Kindergarten. This research uses an artistic method which is an unpatterned activity. The results of this study found that the ability of inquiry science in early childhood in the kindergarten group was still not optimal with the stages of inquiry science namely orientation, formulating problems, submitting hypotheses, collecting data, testing hypotheses, and formulating conclusions. Inquiry science at Hidayatulloh Lidah Kulon Kindergarten can be seen in the ability of children to be oriented towards the learning process, formulate problems, propose hypotheses, collect data, test hypotheses, and formulate conclusions in teaching and learning activities, but inquiry science activities are not maximized.

Keywords: Inquiry Learning, Science Introduction, Simple Experiment.

Introduction

Good and quality human resources can be prepared from education from an early age. At an early age, growth and development are both physical, emotional, social, and intellectual in the golden age. During this period, optimal stimulation is needed so that the potential possessed by children can develop and grow optimally. One of the aspects of early childhood education that needs to be developed is the cognitive aspect. At this time, Early Childhood Education (PAUD) learning in group B (5-6 years) has not emphasized cognitive ability. One way to optimize these abilities is by playing (Holis, 2016). In group B, it is usually done only to provide low-intermediate level knowledge that has not yet led to High Order Thinking Skill (HOTS). HOTS itself is a student's thinking skill in obtaining new information stored in memory, then connecting and conveying it for the expected purpose (Wahid & Karimah, 2018).

Good children's cognitive development is needed to learn and explore the environment, solve problems, learn cause and effect, and other thinking skills, because cognitive ability is the ability to process information from the environment through the five senses. Introducing science can improve a child's logical thinking effort. Introduction to science should be packaged in interesting learning using methods that are appropriate for age, so that it can stimulate the development of children and involve all five senses, Introduction to science is part of the development of cognitive abilities that can be given to children. However, in field practice in PAUD, the introduction of science is only limited to theory.

The introduction of science in early childhood will be more effective by applying the right learning methods, which allow children not only to learn various concepts from science but they

discover and experience the knowledge themselves during learning. The inquiry learning model is one of the interesting and challenging learning models for children's thinking skills to learn science. Through the inquiry learning process, children come up with initial concepts to explain and investigate more deeply from the problem.

The inquiry approach is a series of learning activities that focus on the process of thinking critically and analytically in order to find and find a solution to a questionable problem. Science inquiry is a field that helps develop critical thinking skills in early childhood. In general, science learning in PAUD aims to enable children to actively seek information about things around them. Early childhood has a high curiosity, through exploration in this field of science children try to understand their world through observing, investigating, and conducting experiments. At a child's age, we cannot predict with certainty what facts are important for a child to learn in the coming years. Each individual will always face new problems that must be solved because life is a series of problems. Thus, learning inquiry science in early childhood is very important because it can create a generation that is resourceful and qualified.

In accordance with the current curriculum that applies scientific learning, it is very much in line with inquiry science learning, inquiry learning is a process in which children are involved in their learning, formulate questions, investigate extensively and then build understanding, meaning and new knowledge. Inquiry science knowledge is effective in improving and helping students motivate in science, technology, engineering, and mathematics (STEM) and improve children's understanding of simple scientific concepts.

Methods

This method is often referred to as the artistic method, because the research process is more artistic or less patterned, and is referred to as the interpretive method because the data from the research results is more related to the data found. The approach used in this study is a case study approach, one of the qualitative approaches that examines a particular case. Then a holistic analysis of the case was continued through the elaboration of a description of early childhood inquiry skills.

Research Results and Discussion

Inquiry science learning activities

The research was carried out at Hidayatulloh Lidah Kulon Kindergarten. The following is a snapshot of learning in one day at Hidayatullah Kindergarten:

Table 1
Results of Inquiry Learning Implementation

Observation Location	Hidayatulloh Kindergarten Lidah Kulon
Number of Teachers	2 Teacher
Number of Children in a Class	13 Children
Age Group	5-6 Years
Structuring the Learning Environment	Classes are organized in groups
Learning Implementation	Morning routine (marching in front of the class, Reading short surahs, as well as movements and songs) After the morning routine (children sit in their respective chairs, greet and pray before studying) The teacher asks the children "What are the properties of water?" and "What are the types of water?" The teacher told me about the properties of water

	Teachers give children the opportunity to tell their experiences about water Teachers give children the opportunity to experiment with the volume of water The teacher accompanies the child during the experiment Children tidy up the playground Recalling and taking breaks

Before applying simple experimental learning to water, the researcher made observations on group B children of Hidayatulloh Lidah Kuon Kindergarten. The results obtained showed that children in group B still lacked understanding and skills in science, this was due to the lack of learning facilities for children specifically to practice understanding and skills in the field of science. Experimental science learning activities using the inquiry learning method are applied to improve the quality of learning and hone children's knowledge and skills in the field of science. The following are the results that children get after conducting simple experimental activities with the inquiry learning method:

Table 2
Classification of simple experimental results

No	Child's Initial Name	Score	
		Knowledge	Skills
1	AND AND	BSH	BSH
2	TW	MB	MB
3	ON	MB	MB
4	KV	BSH	BSH
5	TO	MB	BB
6	PU	BSB	BSH
7	MS	BSH	BSH
8	DT	BB	MB
9	UB	BSB	BSB
10	ZF	BSH	MB
11	THEM	MB	MB
12	To the	MB	BSH
13	GT	BSH	BSH

The table above explains that the results of the implementation of simple experimental activities in Group B children of Hidayatulloh Lidah Kulon Kindergarten are very different. Here are the results obtained

Knowledge		Skills	
BB	: 1 child	BB	: 1 child
MB	: 5 children	MB	: 5 children
BSH	: 5 children	BSH	: 6 children
BSB	: 2 children	BSB	: 1 child

At the beginning of learning, it was carried out through opening activities, core, then continued. Learning activities are carried out in a structured manner in accordance with the daily learning plan that has been previously designed. The results of the observations are in the following table:

Table 3
Syntax

No	Science Inquiry Stages	Information
1	Orientation	This activity can be seen when the teacher equalizes the material by conducting active questions and answers between teachers and children, but in this question and answer the teacher no longer asks specific things to provoke children's science inquiry.
2	Formulating the problem	In this activity, the teacher invites children to develop thinking skills by presenting children with material that is in accordance with the theme. In this activity, the teacher invites children to think about how to solve problems to determine water activities.
3	Hipotesis	This activity arose when the teacher asked the question "why is the volume of water different in each shape?" at the same time the child answered "because the water follows the container of the mother, so if the container is large, there is a lot of water. But if the container is small, the water is small."
4	Collect data	At this stage, the children exchanged information, there were children who told their experiences about the difference between drinking water and sea water, which they said was very salty sea water, suitable for making vegetable sauce.
5	Testing hypotheses	In this activity, children exchange information about playing in the water and combine stories from experiences while playing in the water according to the activities made by the mother.
6	Formulating the problem	From the results of the hypothesis, the child can conclude that when the container is large, the water used will be a lot and when the container is smaller, the water used will be less.

The implementation of the simple science-based inquiry learning model at Hidayatulloh Lidah Kulon Kindergarten starts from the beginning to the end, namely from the time the children enter the classroom until the recess time (120 minutes). The details of the teaching module that was milked by the researcher are as follows:

Table 4
Details of the simple experimental inquiry science teaching module

General Information	School identity Origin School Compiler name Academic year Level/Class KBM Phase Initial competencies Infrastructure Tools and materials Target students Learning model
Core Competencies	Her/subtema/sub-subtema Learning objectives (Knowledge, Attitudes, Skills)

	Brainstorm activity ideas Meaningful understanding Lighter questions Learning activities Description of learning activities (Morning activities, Core activities, breaks/meals, closing) Assessment Teacher reflection
Attachments	Reading materials for teachers and students Video
Assessment	Anecdotal notes Measurement results Evaluation

Through inquiry learning, children can be seen active in activities, with inquiry science children get the opportunity to observe, ask, explain, test hypotheses and determine answers to problems systematically and critically. Inquiry is a learning that focuses on activities and direct learning. Developing inquiry science skills in early childhood education institutions is very important, because inquiry science enables children to be independent in activities both individually and in groups as well as exchange ideas and evaluate what they have done. Inquiry science is a high-level thinking skill to develop children's thinking and develop problem-solving methods.

The purpose of using the inquiry science learning strategy is to develop critical skills, to develop children's intellectual abilities as part of the initial process. The ability of early childhood inquiry science can go through the following steps:

1. Orientation

The orientation stage is a stage to foster a responsive learning atmosphere. Learning must foster and stimulate children to think and solve problems. Several things that can be done in the orientation stage:

Explain the topic of learning objectives and expected learning outcomes that can be used as targets that can be achieved by children.

Explain the main activities that must be carried out by children to achieve goals.

Explain the importance of topics and learning activities in children. This is done in order to motivate children to learn. Based on the results of observations, teachers provide stimulation to children to formulate problems in learning activities with the theme of water, fire, and air.

2. Formulating the problem

Formulating a problem is a stage that brings children to a problem that contains questions or puzzles. The problem presented is a mistake that challenges children to think about solving the puzzle. It is said to be a puzzle because in the formulation of problems children are encouraged to find answers so that all problem formulations have answers. Some things that must be considered in formulating problems are:

a. Problems should be formulated by the child himself. This will cause high motivation to learn when involved in formulating the problem to be studied.
b. The problem to be studied is a problem that contains a puzzle with a definite answer. This means that teachers need to encourage children to be able to formulate problems that according to the teacher actually already exist, all the children need to do is find and get the answer definitively.
c. The concepts in the problem are in concepts that are already known in advance by the child. The child will formulate a problem for how water works to form a container, but before the teacher explains about it, several children know how the concept of water works.

3. Finding a hypothesis

A hypothesis is a temporary answer to the problem being studied as the answer to its truth, the hypothesis needs to be tested first for its truth. The ability or potential of the individual to think is already possessed by every child from birth. The potential to think starts from the ability of each individual to guess from a problem. When an individual can prove his guess, then he is in a position that can encourage him to think further. Children formulate hypotheses based on what the teacher explains and based on the experiences they have gone through. In connection with the experiment activities, the teacher asked the following questions:

a. What are the properties of water?
b. How does water in a container work?
c. Is the water volume of each container different?

4. Collect data

Collecting data is an activity to collect information needed by examiners to support the hypothesis proposed. In inquiry learning, collecting data is a very important process in the intellectual development of children. The process of collecting data not only requires strong motivation in learning, but also requires perseverance and the ability to use the potential to think in children. Therefore, at this stage, teachers have an important role in asking questions that can encourage children to think and find the information they need. Children collect data on how water works in containers by collecting information from teachers and storytelling experiences with friends.

5. Testing hypotheses

At this stage, answers are received according to the data or information obtained based on data collection. The most important thing in testing hypotheses is to find the child's level of confidence in the answers given. On the other hand, hypothesis testing also means developing the ability to think rationally. Where the truth of the answer given is not just an assumption, but is supported by the data found and can be accounted for. After exchanging information and equalizing perceptions, children will practice directly so that they can prove the problem.

6. Formulating conclusions

In the last stage, the process of describing the findings obtained based on the results of hypothesis testing. Formulating conclusions is the ultimate goal in the learning process. Due to the large amount of data obtained, there is often invalidity of the data or lack of focus on the problem to be solved. Therefore, to reach an accurate conclusion, the teacher should be able to show the child which data is relevant after the child reflects by drawing the conclusion that when pouring water into different containers, the water will make scientific changes, namely adjusting the shape of the existing container.

Conclusion and Recommendations

Based on the results of the analysis, it shows that the ability to develop inquiry science in early childhood has not been maximized, this statement is seen from field observations that there are still many children who do not understand the meaning of simple science. Many children are not involved in learning and often do not complete the variety of games provided by the teacher.

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