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IMPROVING THE UNDERSTANDING OF SCIENCE CONCEPT THROUGH GUIDED DISCOVERY LEARNING MODEL IN AZZAHRA PRESCHOOL KINDERGARTEN

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Abstract

Understanding simple concepts (scientific concepts) was one of important understanding in aspects of cognitive development for early childhood. Children were trained to think actively and critically in order to understand they activities, namely by applying a constructivist approach or guided discovey learning. However in Azzahra Preschool Kindergarten has not applied a guided discovey learning. It considered to be a factor in children's low understanding of science concepts. Therefore, this research aimed to improve the children's understanding of science concepts by applying guided discovery learning. This research used a classroom action research with two cycles. Subject of this research is all of children group B in Azzahra Preschool Kindergarten. And the results show that the guided discovery learning can improved children's understanding of science concept. This is based on percentage score of children's understanding of science concept which is increasing in each cycle. Other findings of this research showed that children were eager to learn, curiosity was increasing, and active to conduct experiments to discover various simple concepts. So, this research was recommended that apply the guided discovery learning model to develop various aspects of the child.

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INTRODUCTION

Early childhood is an individual who is undergoing a process of rapid development or known as the Golden Age. (Sit, 2015) Early childhood development includes various aspects. In general, early childhood development includes physical, social, emotionals and cognitive development. However, some experts develop aspects into more detail development. (Santrock, 1964) states early childhood development is related to physical, cognitive, social-emotional, social context, moral, language, self-identity, and gender development. (Kail & Reese, 2002) explains that the scope of early childhood development includes the development of independence, morals, social, language, physical, and cognitive. From some of these opinions it is concluded that there are six aspects of early childhood development, namely aspects of development: religious and moral values, social emotional, physical motor, cognitive, language and art. All aspects of child development can basically be developed in early childhood education through a variety of activities provided by the teacher. However, it is often found that children have not understood something yet that is done in their environment, so concept learning is needed for them from an early age. This concept learning belongs to aspects of cognitive development. Children are taught to think actively and critically in orders to understand what other people are doing and how to do it. According to (Nugraha & Gustina, 2019) one of learning result in this aspect of cognitive development is that children are able to recognize simple scientific concepts. Science is from the point of language, science derived from the Latin language Scientia means knowledge. Based on preliminary observations at the Azzahra Preschool Kindergarten showed that 12 of 13 children had not understood yet about science, their understanding is low and only 1 child who is categorized to develop in understanding it. This happened because learning in schools did not pay attention to the understanding of science concepts so that children did activities just following the procedure without the achievement and reinforcement of real concepts. This problem is considered important because according to (Saepudin, 2011) the focus of science learning development in early childhood should be aimed at understanding, interest in, and appreciation of early childhood towards the world in which they live or reside. It can be interpreted that the understanding of science concept becomes a basic understanding for early childhood about life.

Science material that is suitable for preschoolers, especially those aged 5-6 years, should be more first-hand experience, not learning abstract science concepts. In addition, science learning should develop the ability to observe, classify, measure, use numbers, and identify causal relationships. Science materials in early childhood included: recognizing movement, liquid objects, scales, animals and plants. (Maisarah, 2019a) The emergence of the problem is caused by various factors. Dominant factors that influence the understanding of children's science concepts come from the school environment, included: teachers, learning models, and facilities and infrastructure.

Learning models that are considered suitable for developing understanding of science concepts in children are guided discovery learning models. Research result of (Agustina, 2014) that the understanding of Science concepts of children in group B of Aisyiyah Bustanul Athfal Gulon Jebres Kindergarten is low. This is obtained from the initial conditions regarding up and down that only 7 of 22 children reach completeness or 31.82% so the understanding of children's science concept in the kindergarten is low. Then in the first and second cycles, an action in the form of a guided discovery learning model is applied to obtain an increase in understanding of children's science concepts and achieve a classical completeness value of > 80%. Research shows that at the end of cycle 1, the number of children who get good grades, mentioning the material used in the experiment 70%, diligently observing the experiments being carried out by the teacher 75%, mentioning what objects are floating 65%, mentioning any objects which hover 65%, mentioning what objects sank 75%, explaining why they float, hover, sinks 65%. In cycle II the number of children who got good score on the aspect of mentioning materials, the tools used in the experiment was 85%. According to Jacobsen, Eggen & Kauchak in (Ali, 2016) that Guided Discovery is a teaching model designed to teach concepts and relationships between concepts.

Thus, the application of Guided Discovery learning models considered to be a solution or action to improve understanding of

scientific concepts. So the research was carried out with the title "Improving the Understanding of Science Concepts through Guided Discovery Learning Models in Azzahra Preschool Kindergarten.

This research also aims to support theories and other research results which prove that early childhood requires directional guidance and direct experience to understand scientific concepts that exist in life. (Hushman & Marley, 2015) proved that students who received guided instruction correctly designed a greater percentage of experiments and self-reported greater changes in science understanding compared to children learning using tutorials or lectures. (Baroody et al., 2015) also suggest using targeted guidance in achieving fluency in early childhood abilities. (Wang & Wang, 2015) has a same opinion that children's cognitive development is still at the stage of self-regulation between resisting temptation, regulating emotions, and learning tasks, education must provide children with opportunities for exploration and experimentation supported by demonstrations and deliberate instruction. , as well as guided discovery. (Großmann & Wilde, 2019) added that students with low initial knowledge of science need directional guidance to produce higher conceptual and procedural knowledge. Thus, early childhood requires guided discovery learning so that they understand the concept of science in their lives. Guided discovery is also considered important because it is a model of a constructivist approach. (Patterson, 2011) teachers should use a constructivist approach in facilitating their learning in science, because this approach is more motivating and allows students to learn better. One of the learning models in a constructive approach is guided discovery learning.

This research is important to be carried out and published because in early childhood there are often misconceptions about science, including: early childhood understands that differences in containers can change the volume of a liquid object (not the nature of a liquid object that follows the shape of the container). If early childhood understands wrong scientific concepts or misconceptions, it will be difficult for them to understand more complex concepts at the next level of education. This is because each concept has concept prerequisites that must be understood first. In accordance with Gagne's opinion in (Maisarah, 2014) that every subject has learning prerequisites or prerequisite skills. Prerequisite skills are also defined as initial abilities which according to (Yamin, 2013) have a definition, namely the entry behavior that students have acquired before they acquire certain new terminal abilities. Entry behavior can determine where teaching should begin. If early childhood has a experiences misconceptions, it is likely that they will have difficulty obtaining advanced concepts or terminal abilities. (Winarni, 2017) argues that early childhood education (PAUD) is the basis for higher children's education and prepares a generation of learners who have a healthy spirit of competition. This can be done through science learning. This is the urgency for conducting research with the hope that early childhood does not experience misconceptions. This research is suggested to teachers or educators in the early childhood education to be wiser and smarter in determining the appropriate learning stages of early childhood cognitive development, one of which is by applying the guided discovery on science learning.

METHODS

This research is a classroom action research. According to (Maisarah, 2019b)classroom action research has a meaning as a research method that examines and resolves problems in the classroom by providing a new action. Thus, this research begins with a problem that is the lack of understanding of children's science concepts, and the existence of efforts to solve problems using new actions, namely the guided discovery learning model. (Arikunto, 2012) argues that classroom action research is carried out with several cycles consisting of four components, namely: planning, action, observation, and reflection. At the planning stage, daily lesson plan is prepared that applies the guided discovery learning model and supporting instruments. In action stage, learning is done based on daily lesson plan. In observation stage, the observation sheet is used to understand children's science concepts using the Guttmann rating scale. In the reflection stage, the data obtained from the instrument are analyzed and note the shortcomings of the learning process so that it can be corrected in the next cycle until an increase occurs. Data analysis techniques used in classroom action research

according to (Sugiyono, 2017) is the percentage of individual completeness with a success requirement is greater than 60%, and the percentage of classical completeness with a success requirement is greater than 80%. This research also used gainscore (Maisarah, 2019c) which a formula aims to get a view of increasing scores. The increased score is from pre-action to cycle I, and from cycle I to cycle II.

RESULTS AND DISCUSSION

This class action research report was presented by displaying an analysis of students' mastery learning. The analysis was used to know the increase in understanding of children's science concepts through the Guided Discovery learning model at Azzahra Preschool Kindergarten. This research was conducted in the second semester with the theme of water, air, fire, and sub themes of floating, flying, and sinking. The study was conducted in two cycles which had four repetitive stages that were explained in the method section. Thus what were presented in this section are only the stages of observation and reflection that are integrated in both cycles.

Implementation at the pre-cycle stage is the first step of classroom action research by observing the actions taken by the teacher in the form of the application of classical learning models. Initial observations found that children had not been able to do their own experiments and still did not understand about understanding these science concepts. According to (Muchlis, 2014) there are several scientific concepts in early childhood, namely: (1) recognizing objects around them, including weighing, and measuring; (2) the inflatable balloon is then released, the air moves; (3) objects put in water (floating, sinking, hovering); (4) dropped objects (gravity); (5) experiments with magnets; (6) watching with a magnifying glass; (7) trying and distinguishing various tastes, smells, and sounds; (8) mixing color; and (9) growth plant processes.

States the concept of science for early childhood, namely: (1) recognizing springy and flexible objects; (2) recognizing motion, children are very happy to play with objects that can move, play, roll, bouncy or degenerate; (3) recognizing liquid objects, activities that can be done with water that is volume conversion, activities that can be carried out such as filling large bottles, then moving smaller bottles and vice versa, children learn to use numbers to calculate the amount of water that is put into the bottles. The child will also practice understanding more and less understanding. Sinking and floating, soluble and insoluble, water flows and recognizes the properties of various liquid objects; (4) recognizing the scales / balance to train children to connect cause and effect because the results will be seen directly; and (5) playing soap bubbles. From some opinions, then scientific concepts are determined taken in this research are recognizing objects that are put into the water with experiments of sinking, floating, hovering (Suyanto, 2005). Thus, understanding the concept is divided into four indicators, namely: (1) mentioning five tools and materials used in the experiment activities of sinking, floating and hovering with egg media (transparent containers, water, eggs, salt, spoons); (2) distinguishing the simple concepts of sinking, floating and hovering with egg media; (3) conducting experiments on sinking, floating and hovering with egg media; and (4) finding out why eggs can sink, float and hover. Then the indicator is used as a benchmark assessment of observation sheet. Observation sheet of understanding of science concepts in children is used when the teacher applies the guided discovery learning model in the class in cycle I and cycle II, while the pre-cycle has not applied the guided discovery learning model. The observations are presented in Table 1 and Figure 1:

Table 1. Observation Results on Understanding of Children's Science Concept

Indicators	Pre-cycle	Cycle I	Cycle II
The children are able to mention five tools and materials used in the experimentation activities of drowning, floating and hovering.	46,15%	76,92%	99,99%
Children are able to distinguish the simple concepts of sinking, floating and hovering with egg media.	0%	38,46%	84,6%
Children can do experiment activities of sinking, floating and hovering.	0%	61,53%	92,3%
Children know the cause of eggs why can sink, float and hover.	0%	38,45%	84,61%
Mean	11,53%	53,84%	90,37%

Table 1 shows that an increase in the percentage of students meet the criteria of developing as expected and developing very good in each indicators of understanding children's science concept after applying guided discovery learning model (cycle II and cycle II. Data explanation in detail is based on the indicators, as follows:

a. Mentioning five tools and materials used in the experiment activities of sinking, floating, hovering in the pre-cycle was 46.15%, in the first cycle increased to 76.92 %% and in the second cycle increased to 99.99%.
b. Distinguishing simple concepts of sinking, floating, hovering with egg media in the pre cycle was only 0% or there were no children who met the criteria of developing as expected and developing very good, in the first cycle increased to 38.46% and in the second cycle increased to 84.6%.
c. Conducting magic egg experiments in the pre cycle was only 0% or no children met the criteria of developing as expected or developing very good, in cycle I it increased by 61.53% and in cycle II it increased to 92.3%.
d. Finding out why eggs can sink, float, hover in pre cycle was only 0% or no children met the criteria of developing as expected and developing very good, in the first cycle increased to 38.45% and in the second cycle increased to 84.61%

After carrying out research for 2 cycles, the writer got the overall results of the research, namely increased understanding of children's science concepts that could be compared between initial conditions / pre-cycle, the action results of the first cycle, and second cycle. From the data of research results indicated an increase in understanding of children's science concepts through the Guided Discovery learning model. The increase was in accordance with the achievement targets that the writer had set for each cycle. Thus it can be concluded that the use of the Guided Discovery learning model can improve the understanding of children's science concepts in Azzahra Preschool Kindergarten at Captain M. Jamil Lubis street No. 57 Medan.

This is in line with the opinion of (Sujiono, 2010) that science is defined as an object of discussion related to the study field about reality or facts and theories that are able to explain about natural phenomena. From Archimedes' theory according to (Bimbel, 2011) that objects that get into the water can experience several possibilities, namely floating, hovering and sinking.

Sinking and floating activities can be done in class or outside the classroom. If in class, give a plastic mat and newspaper so that water does not wet the place. The purpose of this activity is so that children are given the experience that there are objects that sink and some that float. Children often think that small objects float and large ones sink. Sinking or floating is not determined by the size of the object but by the weight of the object. Activities can also be done by introducing that submerged objects can be made floating. From this activity the child will also understand why a heavy boat can float, and the difference is with a submarine. (Maisarah, 2019a)

From some opinion, the understanding of science concepts of early childhood, especially regarding sinking, floating and hovering should be done with activities in the form of experiments as applied to the guided discovery learning model. So that the activity is not just an experiment but it found the real concept related to the conducted experiments. This was also supported by research results from various countries that had been published in national and international journals, including the following:

The view suggests treating science as a system of knowledge and human actions, and investigating it using general system theory notions and categories (Broszkiewicz, 2013). It is supposed to help us to determine the right relations between different values of science and to understand that science is not an isolated thing, but a totality which is not just a sum of its parts. (Ekawati et al., 2018) The students' content analysis and science process skills of the experimental group (scien¬tific independence-based learning with inquiry model) and control group (direct learning model) differed quite remarkably. Broszkiewicz's research suggested an integrated system between the concepts of knowledge and human action, so that it could be interpreted that science was influenced by the activities carried out by humans themselves in gaining knowledge. This wass supported by Ekawati's research which proveed that science (science process skills) used inquiry learning better than direct learning.

Implementation of the Inquiry Discovery Method Can Improve Understanding of Simple Science Concepts (Sriyati, 2019). Thus, Inquiry and Discovery can be done separately or in combination because both are activities based on discovery or experimentation activities so that this research proves that the concept of science can be influenced by experimental activities as research results (Wahyuni et al., 2017) shows that the science process skills developed at every phase comprise of making observations, formulating hypotheses, experiments, creating data, classifying and analyzing the data, formulating its conclusions, communicating, and applying the concepts and making predictions obtained by the average value of 75.33 in the good category. Thus it takes discovery-based learning activities (observation to communication) to form an understanding of scientific concepts.

The subjects of this research were children aged 5-6 years, who were stated as early childhood. The science concept in early childhood education is included in aspects of cognitive development. The basic theory of learning (Piaget & Inhelder, 1969) states that every organism that wishes to adapt to its environment must achieve a balance (equilibrium), that is, between individual activities on the environment (assimilation) and environmental activities on individuals (accommodation). For equilibration to occur between individuals and the environment, assimilation and accommodation events must occur in an integrated, together and complementary manner. Piaget divides cognitive development into 4 stages namely sensorimotor (0-2 years), preoperational (2-7 years), concrete operations (7-11 years), and formal operations (11-15 years). Based on Piaget's opinion, children aged 5-6 years are at the preoperational stage. (Sit, 2012) states that at this age children will ask a lot of questions "why?". The question why is question most asked by children, because they really want to know the reason for everything they see and hear. For examples if parents say they cannot play on the highway, they will spontaneously ask: "Why can not?". This is related to the causal relationship or causality so real activities are needed to provide an understanding of a concept.

(Bruner, 1990) describes the main concepts in cognitive development, namely: (a) intellectual development is characterized by increasing variations in responses to stimuli; (b) growth depends on intellectual development and information processing systems that can describe reality; (c) intellectual development requires increased ability to say to oneself and others through words or symbols; (d) the interaction between teacher and student is very important for cognitive development; (e) language is the key of cognitive development; (f) cognitive growth is characterized by an increasing ability to solve various alternatives simultaneously. (Vygotsky, 1978) argues that the learning process will occur efficiently and effectively if children learn cooperatively with other children in an atmosphere and environment that is supportive, as well as guided by someone more capable, teacher or adult.

From the three cognitive development experts (Piaget, Bruner, and Vygotsky) it can be concluded that learning will be effective if it is carried out with real activities (experiments) and there is discussion in finding a concept. This is also supported by research results (Kotzebue et al., 2020) which prove that in the investigated experimental situations, only a few cognitively activating measures were implemented by the teachers or the educators. However, cognitive-stimulating education is likely to be positively associated with student learning and it is therefore desirable to implement it e.g. (Kunter & Voss, 2011) At the same time, however, these findings are consistent with other studies showing that the potential for learning opportunities in which learners are cognitively activated is not exhausted (Förtsch et al., 2017). However, intervention studies indicate that the goal of providing cognitively stimulating learning situations could well be realized (Seidel, 2014).

Other findings from this research are the positive and negative impacts collected and recorded by researcher in the first cycle and second cycle which are used as material for research reflection. Positive impact on cycle I and cycle II, namely: (1) understanding of children's science concepts increases with the existence of experimental activities; (2) A learning atmosphere is pleasant because it uses experiments, so that it fosters children's interest to do activities; (3) not only understanding of science concepts increases but also positive attitude does; (4) understanding of science concepts in the second cycle has reached classical completeness more than 80%. While the negative impacts or weaknesses that need to be refined, namely: (1) in the first cycle it was found that the experimental activity requires examples and direction in advance so that children are not confused because the guided discovery learning model is a new action in this school, but this has been perfected in cycle II by the teacher demonstrating or examplifying the experiment briefly then facilitating the child's experiment; (2) in cycle I, children were still unmotivated in answering questions after conducting experiments, so that in cycle II the teacher involved children who were less active in experimenting so that all children became enthusiastic; (3) in cycle I children are not concentrated so that in the second cycle learning begins with apperception activities, providing information about the experiment and its purpose so that children focus on what will be achieved and the concentration of experimenting according to instructions is from the teacher or researcher.

The research results (Parno, 2015) reveals that the average mastery of basic concepts possessed by students after using the Guided Discovery learning model is higher than normal learning. The Guided Discovery learning model is able to make students give positive responses, namely 58.33% agree and 38.22% strongly agree. (Herlily et al.,

2018) The results showed that the competence of the knowledge of learners ranging from prasiklus until the third cycle is 63.33%, 70%, 80% and 90%. The completeness of competence attitudes of learners ranging from prasiklus until the third cycle is 62.71%, 69.3%, 77.08% and 85.67%. Based on this, it can be concluded that an increase in the competence of learners in learning science by applying the learning model Guided Discovery Learning. This is in accordance with the opinion (Deneher, 1973) guided discovery made by learners can lead to the formation of the ability to perform free at a later invention. Guided discovery learning activities have similarities with learning activities oriented process skills. Guided discovery learning activities emphasize on the learning experience directly through the investigation, found the concept and then apply a concept that has gained in everyday life.

Other research on the Guided Discovery learning model (Pardede et al., 2016) which proves that there were significant differences between students' science process skill taught by using Collaboration Based Guided Discovery Technique using Flash Media with conventional learning. (Allo & Sebayang, 2019) prove that the implementation of the Guided Discovery Learning (GDL) model using simple tools can make concept comprehension being very good. Guided learning models also affect many things, including as stated that (Putra et al., 2018) The research finding supported the theory and the previous research stating that there was a difference in critical thinking skills between the two models. The students who joined the INSTAD and Guided class had the highest critical thinking skills indicators except for the explanation.

Thus, guided discovery learning models can be applied to early childhood. Even from the research results, the understanding of children's science concepts increased 90.37% and children have finished learning, even the children's positive attitude and children's communication are trained and have good value. That is because the guided discovery learning model has various advantages and has been proven to provide some positive influences.

CONCLUSION

The results of this research can be concluded into several points, namely: (1) 11.53% of children in the pre-cycle stage have an understanding of scientific concepts that develop as expected; (2) 53.84% of children in the first cycle stage have an understanding of scientific concepts that develop as expected and develop very well; (3) 90.37% of children in the second cycle have an understanding of scientific concepts that develop as expected and develop very well; an (4) an increase in the percentage of children is 42.31% from pre-cycle to cycle I, is 36.53% from cycle I to cycle II and has reached the classical completeness limit, more than 80%.

It can be concluded that the implementation of guided discovery learning model can improve the understnding of children's science concept in grup B. The other research finding shows that the children are eager to learn, curiosity is increasing, and active to conduct experiments to discover various simple concepts. Thus, it is recommended that early childhood education / other equivalent schools apply the guided discovery learning model to develop various aspects of the child.

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