The Role Of Teachers In Increasing The Scientific Literacy Of Early Childhood

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Abstract

Early childhood education provides services in developing and facilitating children's growth and development in a safe and enjoyable atmosphere. Teachers are required to develop these services in the form of fun learning activities according to the child's age and level of development. Scientific literacy is one of the abilities that must be developed in early childhood. However, based on the results of field surveys through interviews with early childhood teachers from several kindergartens in Depok City, it shows that teachers' abilities in designing science based learning activities are still limited to simple science experiment activities. Teachers have not optimally used the surrounding environment as a learning resource and medium. Based on the problems found, this research aims to analyze teachers' abilities in designing fun science play activities. Researchers used literature studies to determine the role of teachers in introducing science content through fun play. A qualitative descriptive analysis method was used to describe the results of this research. The research results obtained show that the teacher's ability to introduce science content through fun activities will make it easier for children to understand science content. The better teachers understand science content and develop it in the form of fun play activities, the easier it will be for children to have an understanding of science and meaningful experiences.

Keyword: Literacy Science, Teacher, Early Childhood

1. Introduction

Children learn from their surroundings to find answers to their great curiosity and practice their skills in observing objects and events that occur around them. They learn through play, play activities can be done alone and with adult direction. Through playing, children can increase their vocabulary, hone their memory, imagination and develop their creativity. When playing, children can do many things, so that children gain a lot of information and meaningful experiences from the direct practice they do. Playing is done by children based on encouragement that arises from within the child, not based on orders or encouragement from other people. Play activities can be done individually or in groups. Scientific literacy is scientific knowledge and skills to identify questions, obtain new knowledge, explain scientific phenomena and draw conclusions based on facts, understand the characteristics of science, awareness of how science and technology shape the natural, intellectual and cultural environment and want to be involved and care about issues. science. Children's science abilities through science process skills are one of the abilities that early childhood must master in facing 21st century skills (Punia Turiman et al,2012). Scientific literacy helps children shape thought patterns, behavior and character so that children care and are responsible for themselves, the environment and the problems they face. Playing with science in early childhood is more about developing the ability to understand simple scientific concepts, not theories or scientific formulas. Early childhood science play activities are carried out by observing real objects, looking for causes and effects and events. Children build understanding based on previous knowledge and experience (Zulaikha & Rohman, 2020). According to Newman 1987, science is a process of understanding the world through observation and manipulation, in which there are scientific activities. Science play activities also provide opportunities for children to explore, develop various hypotheses and continuously prove them, practice thinking processes, observe what happens, find information, then ask questions about what is being done and formulate answers. The introduction of science in early childhood is not defined as learning science, but rather as cultivating critical traits, curiosity, thoroughness, exploration to find answers and regular thinking through fun experimental activities (Zahro et al., 2019). The introduction of science to early childhood emphasizes the science process rather than the product, so that children are able to interpret the science activities they do well. Based on the results of observations at early childhood education institutions, several problems were found regarding children's low scientific literacy abilities. This is because science play activities are less diverse, limited to simple science experiment activities, the learning methods delivered are not appropriate, the learning media available around them is not optimized and the teacher's lack of understanding of science content that can be introduced to early childhood. So that children's ability to understand and carry out scientific practices is limited, children lack awareness of science in their environment and logical and critical thinking abilities are not stimulated, children are given less opportunity to choose and carry out their own desired science activities according to the child's interests and imagination because of their limited abilities. stimulated only mathematical logic abilities.The teacher's ability to introduce science content through fun activities will make it easier for children to understand science content. The better teachers understand science content and develop it in the form of fun play activities, the easier it will be for children to have an understanding of science and meaningful experiences (Gerde, et all.

2017). Even though teachers' science content knowledge is predictive of children's science learning (Loucks-Horsley, Love, Stilles, Mundry & Hewson, 2003), there are still many teachers who lack science skills that can support their understanding of science.

2. Literature Review

2.1 Science Literacy

Literacy is not only limited to the ability to read and write, but there are 6 (six) basic literacy skills that must be achieved. One of them is scientific literacy skills. According to the Organization for Economic Cooperation and Development (OECD, 2016), scientific literacy is scientific knowledge and skills to identify questions, obtain new knowledge, explain scientific phenomena and draw conclusions based on facts, understand the characteristics of science, awareness of how science and technology shape the natural environment , intellectual and cultural and willing to be involved and care about scientific issues. In addition, the National Research Council (NRC, 2012) also states that the series of scientific competencies required for scientific literacy reflects the view that science is an ensemble of social and epistemic practices that are common to all sciences, framing all competencies as actions.

Scientific literacy is part of science, is practical, relates to issues about science and scientific ideas. Scientific literacy has a very broad scope, not only in science learning activities, but also intersects with other literacies. Apart from that, scientific literacy also includes skills and knowledge in making scientifically correct decisions to achieve a comfortable, healthy and better life as well as fostering critical thinking and skills in solving problems creatively. Scientific literacy also fosters an attitude of cooperation with other people in accordance with the principle of togetherness, helps communicate well, is able to choose the right scientific information, understands pictures, charts and tables in scientific information. Able to assess the truth of the scientific information presented, foster curiosity, always think creatively, dare to try even if you fail and never stop learning. Scientific literacy requires scientific concepts, scientific theories, knowledge of general procedures and practices related to scientific inquiry as well as how to advance science itself, so it is very important to build human welfare in the present and the future. Scientific literacy shapes thought patterns, behavior and builds human character to care and be responsible for themselves, society and the universe, as well as the problems faced by modern society which is highly dependent on technology. Children's science abilities through science process skills are one of the abilities that early childhood must master in facing 21st century skills (Punia Turiman et al, 2012).

Scientific literacy helps children shape thought patterns, behavior and character so that children care about and are responsible for themselves, the environment and the problems they face. Children learn from their surroundings to find answers to their great curiosity and practice their skills in observing objects and events that occur around them. Children learn through play, play activities can be done by children themselves and with the direction of adults. Through play, children can increase their vocabulary, hone their memory, imagination and develop their creativity. When playing, children can do many things, so that children gain a lot of information and meaningful experiences from the direct practice they do. Children play based on encouragement that arises from within the child, not based on orders or encouragement from other people. Play activities can be done individually or in groups

Emergent science is terminology first used by Siraj-Blatchford (2001) to describe a science perspective for early childhood. This perspective views science activities as social in nature, driven by the exploration of scientific phenomena and positive engagement. The main goal is the emergence of children's knowledge through a continuous and ongoing process (Larsson 2013), where children's interest in science is the focus and refers to children's expression of interest and understanding of science content. Introducing science activities to early childhood is done through play activities (Fleer, 2015).

2.2 The Role of Teacher

In play activities, teachers play a role in designing activities and teaching and learning processes that are fun so that they support children's emotional and intellectual development (Vygotsky 2016, p. 6). The important thing in play activities is imagination, as a form of children's activities that are oriented towards what is on their minds (Hedegaard, 2016, p. 6). Imagination is a means for children to separate emotions from events and activities which is an important part of learning and creativity to imagine what they do not see, conceptualize what they hear and think about what they have not experienced (Fleer 2015, p. 39). Teachers act as participants and facilitators by providing support in carrying out play activities, so that children gain meaningful knowledge and experience (Siraaj-Blactchfoord, 2009). This illustrates that scientific ideas and concepts carried out in play activities are the result of mutual agreements originating from children's everyday environments which can refer to conceptual play (Fleer, 2011).

Professional development of teacher capabilities is key to ensuring that early childhood teachers provide high-quality learning experiences to children (Browmant et al., 2001: Dawyer, Chait & McKee, 2000: Espinosa, 2002: Helbum & Bergmann, 2002). Teachers must be able to design science play activities that are interactive, innovative, creative and fun by utilizing the surrounding environment. Utilizing the surrounding environment as a medium and learning resource provides opportunities for children to observe and carry out scientific activities directly and optimally so that children are able to identify problems, gain new knowledge and be able to explain scientific phenomena based on direct observations made. The teacher's ability to utilize the surrounding environment as a medium and learning resource provides many advantages (Sitanggang & Hermawati, 2015), including: a) Cost saving, because it is easy to obtain from the surrounding environment; b) Provide real and direct experience according to conceptual learning concepts; c) Meet the characteristics and needs according to the concept of play; d) Become a vehicle for teachers to learn and practice in efforts to increase competency; e) Increasing metacognitive awareness so that strategic skills emerge to develop oneself and the school. Apart from that, Aslindah (2020) uses the surrounding environment as a medium and learning resource to provide meaningful learning experiences, increase children's interest and learning outcomes (Irwandi & Fajeriadi, 2020)

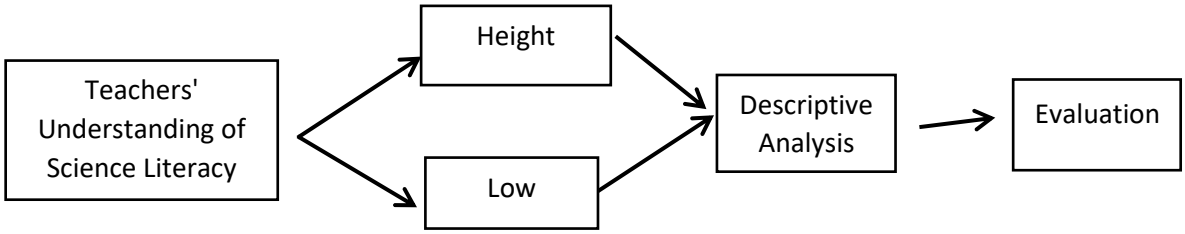
3. Material and Method

The research method used in this research is quantitative descriptive analysis. Descriptive research refers to research that does not carry out experimental activities, but only describes or

explains the symptoms that occur (Arikunto, 2018). This research uses samples from the existing population to measure the population's perspective (Creswell, 2014).

3.1 Design Study

Data collection in the research used a questionnaire regarding teacher Aisyiyah Bustanul Athfal's perception of understanding scientific literacy. The value of each scientific literacy indicator is carried out by conversion according to category. Very good (81% - 100%), good (61% - 80%), fair (41% - 60%), poor (21% - 40%), very poor (≤ 20%)



Gambar 1. Kerangka Pemikiran Penelitian

3.2 Data Analysis

The data collected through questionnaires consists of 3 (three) aspects, namely: a) what the teacher knows about scientific literacy, b) what science activities have been carried out with children, and c) what media the teacher uses in designing science activities to child. This questionnaire was completed by 30 Kindergarten teachers Aisyiyah Bustanul Athfal.

4. Result

The findings and discussion in this research are explained by 3 (three) aspects of scientific literacy, namely scientific knowledge, designing science activities, tools and media used for science activities. Of the 30 people, 18 people knew about scientific literacy, 8 people did not fully know it and 2 people considered scientific literacy as a continuous experimental activity. For indicator (b), 20 people designed science activities involving children's senses, 8 people did simple experiments, 2 people did fun activities. Meanwhile, indicator (c) 30 people use tools and materials sourced from nature and manufacturers.

5. Discussion

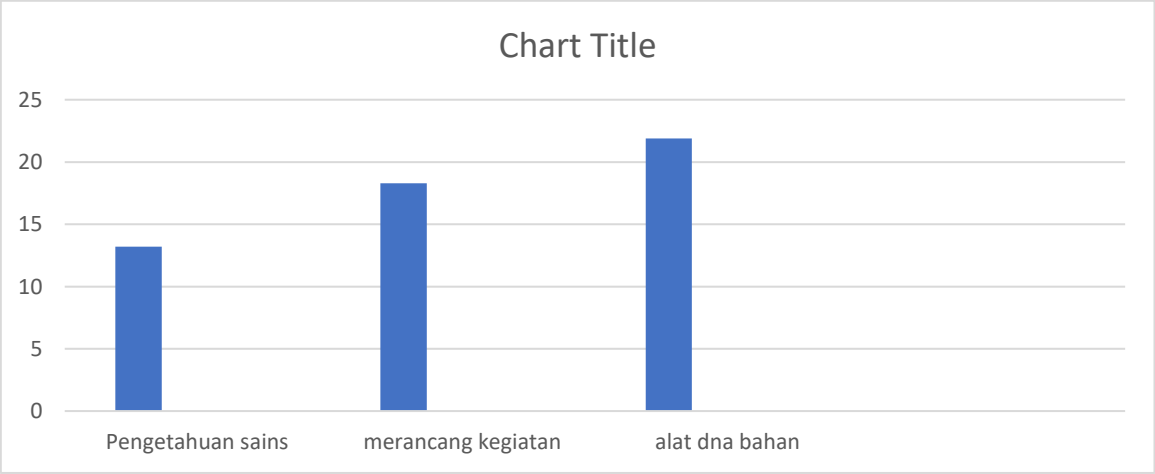
The findings and discussion in this research are explained by 3 aspects of scientific literacy, namely scientific knowledge, designing science activities and the tools and materials used. Based on the questionnaire given, the scores were obtained as presented in table 1.

No	Apect	Indicator	No Indikator	amount	Mark Percentage	Result
1.	Science Knowledge	Understand science concepts Understand the principles and facts of science Understand science content	1 2 3	17 12	5,1 3,6	Enough

				15	4,5	
2.	Planning science activities	Science method Science process skills Application of science concepts in everyday life	4 5 6	20 23 18	6 6,9 5,4	Good
3.	Tools and materials used	Manufacturer Nature and surrounding environment The relationship between science and technology	7 8 9	27 24 22	8,1 7,2 6,6	Good

Figure 1. Questionnaire indicator table

from table 1 it is concluded that the teacher's abilities in 2 aspects are in the good category and 1 aspect is in the sufficient category. A good category is considered if the teacher is able to design fun science play activities using methods and application of science concepts in everyday life using tools and materials sourced from the surrounding environment. A category is considered sufficient if the teacher does not understand the meaning, concepts and content of science in depth and can differentiate between them. The percentage value of the three aspects obtained for the sufficient category of scientific knowledge was 13.2 %, Designing science activities in the good category had a value of 18.3 % and the tools and materials used were in the good category with a value of 21.9 %. The percentage values presented in graphical form can be seen in Figure 2.



6. Conclusion, Implication, and Recommendation

Teachers' understanding of scientific literacy is in the sufficient category in the aspect of scientific knowledge which includes science processes, science activities and science content known to students. Two aspects are in the good category, but still need to be improved so that science knowledge and skills provide deep meaning for children. This research has not linked the level of teacher understanding with the qualifications and competencies possessed by the teacher. Is there any visible influence if teachers who have qualifications as PAUD graduates and have had training activities on PAUD will influence the teacher's ability to scientific literacy? This could be a focus in future research.

Various aspects assessed in teachers' scientific literacy abilities are indicators of assessing the level of teachers' abilities in understanding, designing and using the surrounding environment as a medium and learning resource. Teachers' scientific literacy in the good category states that the teacher has a strong understanding of science. To achieve a sustainable increase in scientific literacy skills, it is very important for teachers to develop a positive attitude towards science (Dragos & Mih, 2015). This was also conveyed by Ramnarain & Padayache, 2015, stating that aspects of scientific literacy such as knowledge, investigation, ways of thinking and interactions with technology and society are an assessment of scientific literacy. Scientific literacy is discussion, argument, communication, investigation and questions about everyday life (Smith et al, 2012), giving rise to a high desire to find answers to these questions. Teachers need to improve their abilities through training activities so that they understand the science material, methods and media used in designing science play activities (Atika et al, 2019). Science learning activities can be applied to any-based learning activities (Utami & Murti, 2019), apart from that, scientific literacy can also develop character values through media in the form of picture books or story books about the local wisdom of a region (ZR & Eliza, 2020). Scientific literacy for young children is the child's ability to know, be aware of and care about the surrounding environment (Penny Husna; Handayani & Srinahyanti, 2018). Developing children's scientific literacy can also be done by using educational game tools in the form of science concepts, science processes and science skills (Widayati et al, 2020) thereby improving children's scientific thinking (Zahro et al, 2019)

Teachers must be able to understand the concepts and content of scientific literacy comprehensively (Yusnia, 2019) so that they have a deep understanding. However, it is still found that teachers do not understand scientific literacy, because teachers do not optimally use various methods and media (Rusdawati & Eliza, 2020), do not understand the application and use of adequate facilities and infrastructure (Solehah et al, 2020). According to Harlen (2004: 64), scientific literacy has 4 (four) elements, namely: a). a helpful concept or idea understanding scientific aspects of the world around us and which allows us to understand new experiences by connecting them with what we already know; b) processes, namely mental and physical skills used in obtaining, interpreting and using evidence about the world around us to gain knowledge and build understanding; c) An attitude or character that shows a willingness and confidence to engage in further investigation, debate and learning; d) understand the nature (and limitations) of scientific knowledge. In developing scientific literacy skills, the most important thing is to develop skills about science, scientific processes, scientific attitudes and children's understanding of science, not just children understanding scientific concepts, but

being able to apply science in everyday life, such as the ability to solve simple problems and make decisions based on scientific considerations so that children have sensitivity and concern for the surrounding environment.

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