

DEVELOPMENT OF SCIENTIFIC THINKING IN CHILDREN AGED 5-6 THROUGH SCIENCE LITERACY

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ABSTRACT

The purpose of this study was to describe the effect of scientific literacy learning on the development of scientific thinking in group B at TK Plus Al Hikmah. The research method used in this research is descriptive qualitative. The subjects of this study were class teachers and group B students at TK Plus Al Hikmah, which consisted of 23 students. The data sources in this study were informants consisting of administrators, educators, and students at TK Plus Al Hikmah. Data sources were also obtained from annual program data, semester programs, RPPM and RPPH obtained from TK Plus Al Hikmah when researchers conducted interviews and field observations. Data collection techniques using observation, interviews and documentation. In analyzing the data, the writer uses descriptive data analysis techniques. Something that describes the actual situation that exists and is mostly expressed in words that are based on facts in the field. The results of the research were 1) scenarios and implementation of scientific literacy learning, 2) the response of group B kindergarten teachers and students to scientific literacy learning, and 3) the constraints experienced by group B kindergarten children in participating in scientific literacy learning. The results of this study have reached the expected indicators, using scientific literacy learning can improve the development of scientific thinking in early childhood.

Keywords: Scientific Thinking; Children Aged 5-6 Years; Science Literacy;

INTRODUCTION

The era of globalization that hit the world, including Indonesia, took place very quickly, which also had a global impact, one of which was in the field of education. Early childhood education as their initial build intelligence and character of children. Where early stimulation will have an impact on their future. One of the lessons that is suitable for laying the foundation for children is introducing literacy, in other words a culture of high literacy shows the nation's ability to think critically, creatively, communicatively so that it can win global competition or is called so that it can answer global challenges in the future, which will be used as the basis for him to survive as well as thrive in the 21st Century.

One of the important literacy to be developed from early childhood is scientific literacy. The World Economic Forum in 2015 also established scientific literacy as one of the six basic literacy which is very important not only for students, but also for parents and all members of

society. The other five basic literacy includes literacy, numeracy, digital literacy, financial literacy and cultural and civic literacy (Kemendikbud, 2017). Scientific literacy in Indonesia was introduced in 1993 through an invitation by UNESCO to take part in the international forum on science and technological literacy for all in Paris and the realization was that a workshop on scientific and technological literacy for all in Asia and the Pacific was held in Tokyo (Pertwi, Atanti & Ismawati, 2018).

Organization for Economic Co-operation and Development or OECD abbreviated (in Pratiwi, Cari & Aminah, 2019) also states that scientific literacy is the ability to use natural science, to identify questions and conclude based on evidence that aims to understand and help make decisions about the natural environment and changes through human activity. Understand the main characteristics of knowledge that is built from human knowledge and inquiry. Be sensitive to how science and technology shape the material, intellectual and cultural environment. Willingness to engage in science-related issues and ideas. Then this understanding is simplified again by Toharudin, et al (2013 in Pratiwi, Cari & Aminah 2019) who defines scientific literacy as a person's ability to understand science, communicate science (oral and written), and apply scientific knowledge to solve problems so that they have an attitude and sensitivity high respect for themselves and their environment in making decisions based on scientific considerations.

Scientific literacy is very important for students to have, the reasons why scientific literacy is important for students to have are: (1) understanding science offers fulfillment of personal needs and joy, can be shared with anyone; and (2) countries in the world are faced with questions in their lives that require scientific information and a scientific way of thinking to make decisions and the interests of many people that need to be informed, such as air, water and forests (Zuriani, in Huryah, Sumarmin & Effendi, 2017).

Based on the opinion of Suyomo, Suharto & Sujoko (in Wulandari, 2017) argues that "Science/Natural Knowledge (IPA) is knowledge formed through a systematic, empirical thinking process based on an attitude of curiosity (curiosity), determination (courage), persistence carried out by individuals to reveal the secrets of the universe. Science learning can train students in the process of scientific thinking, so that it can be seen that science is a collection of knowledge that is arranged systematically and can bring up scientific thinking processes. Scientific thinking is not just a process of thinking systematically and empirically, but being able to master knowledge and apply it in real-life situations.

Thinking according to Salam (1997 in Rijal & Sere, 2017) is an activity to find true knowledge or truth. Thinking can also be interpreted as a process carried out to determine the steps to be taken. Scientific is science. So scientific thinking is a process or human activity to discover or gain knowledge which is characterized by causality, analysis and synthesis.

Thinking logically is thinking according to the rules of thinking, such as half cannot be greater than one (Rijal & Sere, 2017). From the results of scientific thinking that describes knowledge that is clear and can be accounted for. Scientific thinking is also a self-direction, self-discipline, and self-correction. The author himself cannot find a better way of thinking than scientific thinking, because the foundations formed from this way of thinking are very strong. In the goal of science in early childhood, for example, is to develop a scientific attitude. For example, not being quick in making decisions, being able to see things from various points of view, being careful about the information they receive and being open.

Activities in the learning-learning process should emphasize the development of cognitive structure, through providing opportunities for children to gain direct experience in various learning activities that are appropriate to integrated learning and contain meaning, such as making buildings out of blocks, observing changes that occur in the child's environment (plants, animals, water), drawing, cutting, and others related to the development of the basic knowledge of nature or mathematics and the development of language, both spoken language and reading and writing.

Leeper (Nugraha, 2008) also said that the development of science learning in children should be aimed so that children have the ability to solve the problems they face through the use of scientific methods, so that children are assisted and become skilled in solving various things they face, have attitudes scientific attitude in obtaining scientific knowledge or information, including having science process skills. According to Dahar (Mirawati, Nugraha, 2017), science process skills are individual abilities to apply scientific methods in understanding, developing and discovering knowledge.

The goal of developing science learning for children is for children to have the ability to solve the problems they face through the process science method, to improve children's science skills, it is hoped that children will have a scientific attitude and it is hoped that children will be more interested in living science. Through science learning students are trained to be skilled in obtaining and processing information through thinking activities by following scientific procedures (methods), as well as being skilled in making observations, measurements, classifying, drawing conclusions and communicating findings.

Science education from an early age is very important to carry out considering that the development of science learning makes children in a more humane and valued character formation as individuals who must develop in their world and in their environment, meaning that the empirical, objective, logical and scientific properties of science will give a very valuable value for children to be able to become individuals who have rational and can control themselves in a more honest, open and hold on to the existing reality.

Science is very closely in children's lives. Children discover, observe, and learn from science objects in their surroundings. Scientific literacy has the potential to be nurtured and developed in early childhood. In improving the ability to think scientifically itself can be through scientific literacy. Where scientific literacy is the ability to understand science, communicate science, and apply scientific abilities to solve problems.

The goal of developing scientific literacy for children is for children to have the ability to solve the problems they face through the process science method, improve science skills in children, it is hoped that children will have a scientific attitude and it is hoped that children will be more interested in living science.

Scientific literacy for early childhood is when children know, are aware of, and care about their surroundings, so that children can protect the environment and even solve problems in their environment. Early childhood education should be a place for the development of friendly scientific literacy for early childhood through integrated science activities or learning in themes according to the PAUD curriculum. The essence of learning science is not just a concept, but there are processes and attitudes. Science activities in early childhood are more emphasized on process. Science process that is friendly to early childhood is to provide challenging real experiences so as to facilitate children's curiosity by presenting interactive, varied and fun learning.

Learning science itself children will be able to develop the concept of knowledge and scientific thinking skills. In the aspect of scientific thinking ability includes, which develops various kinds of skills. These skills include children being able to be aware of the existence of objects that they do not see, children exploring through their senses and motors the objects around them, being able to recognize objects and manipulating objects/objects, being able to recognize simple concepts and being able to classify, being able to recognize and understand various simple concepts in everyday life, able to understand simple concepts and can solve simple problems in everyday life.

In this scientific literacy all abilities that exist in children can be developed, one of which is the ability to think scientifically. Learning science from an early age can be started by introducing nature by involving the environment to enrich children's experiences and to raise awareness of the environment. Children will learn to experiment, explore and investigate the surrounding environment so that children are able to build knowledge that can later be used in adulthood. In almost every village in West Bandung Regency, PAUD institutions have been established to support the growth and development of early childhood. The establishment of PAUD institutions in West Bandung Regency is a vehicle for stimulating children's growth and development. One of them is the TK Plus Al Hikmah institution.

Through learning scientific literacy which is carried out in early childhood education at Kindergarten Plus Al Hikmah, it trains children to experiment by carrying out experiments,

enriches children's insight to always want to try and try. So that it can direct and encourage children to be creative and full of initiative. Scientific literacy that is applied in the Kindergarten Plus Al Hikmah curriculum is like, using media images, videos, simulations, experiments or demonstrations. From some of the descriptions above, the authors are interested in conducting this research, the author's curiosity is to find out more about how the development of scientific thinking through scientific literacy.

METHOD

The method used in this research is a qualitative approach. As for what is meant by qualitative research, namely research that intends to understand the phenomenon of what is experienced by research subjects holistically, and by means of descriptions in the form of words and language, in a special natural context and by utilizing various scientific methods (Moleong, 2007). The type of this research approach is descriptive. Descriptive research is research that seeks to describe current problem solving based on data. This type of qualitative descriptive research used in this study aims to find out scenarios, implementation of learning, teacher and student responses to learning and find out the constraints experienced by students.

The subjects in this study were a class teacher and group B class students (age 5-6 years) at TK Plus Al Hikmah, totaling 23 people. The characteristics of children in group B in the ability to think scientifically in early childhood are still not optimally achieved. The data collection technique is in the form of a statement about the nature, circumstances, certain activities and the like. Data collection is carried out to obtain an information needed in achieving research objectives. In this study the authors took the object of research at TK Plus Al Hikmah. Data collection in the study at TK Plus Al Hikmah used 3 methods, namely observation, study documentation and interviews.

In this type of qualitative research, data processing does not have to be done after the data has been collected or data processing is complete. In this case, temporary data that is collected, existing data can be processed and data analysis is carried out simultaneously. Data processing in this study consists of Data Reduction; Presentation of Data and Drawing conclusions or verification. Data processing is carried out based on each data obtained from field notes, reduced, described, analyzed, then interpreted. The procedure for analyzing data on problems is more focused on exploring facts as they are (natural setting), using an in-depth analysis technique (verstegen). There are several methods that can be used in qualitative research, and this thematic analysis was chosen because it is a very effective method if a research intends to examine in detail the qualitative data they have in order to find interrelated patterns in a phenomenon and explain the extent to which a phenomena occur through the eyes of researchers (Fereday & Muir-Cochrane, 2006 in Heriyanto, 2018). Data in qualitative research were obtained by thematic analysis which was divided into:

1. Scenarios and implementation of scientific literacy learning in improving scientific thinking skills;
2. The response of group B kindergarten teachers and students to learning scientific literacy in improving scientific thinking skills;
3. Obstacles experienced by class teachers in participating in learning the application of Science Literacy.

RESULTS AND DISCUSSION

After conducting research on children aged 5-6 years (group B) at TK Plus Al Hikmah, with 5 meetings, it turned out to bring satisfactory results for researchers and class teachers. Development of Scientific Thinking Through Scientific Literacy the results can be seen in the observations that have been carried out. Here's an explanation:

1. Scenario and Implementation of Science Literacy Learning in Children Aged 5-6 Years at TK Plus Al Hikmah

a. Scenario of Science Literacy Learning for Children Aged 5-6 Years at TK Plus Al Hikmah

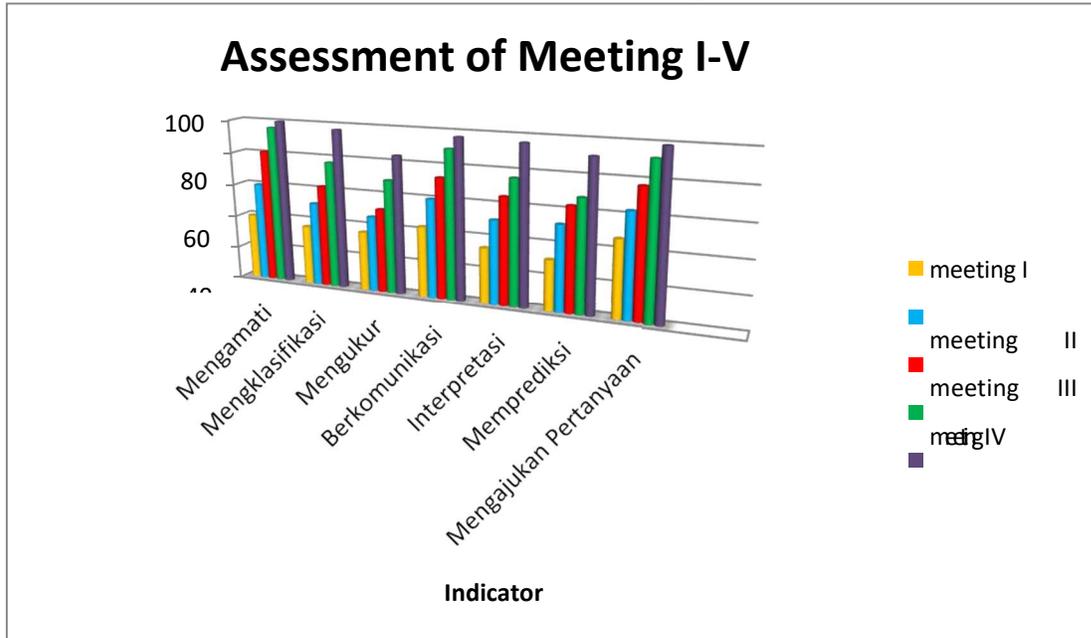
Based on the results of the research, as the researchers have stated above, it shows that the scenarios that must be carried out by the teacher before carrying out scientific literacy learning in early childhood are the same as other lesson plans. Wiedarti et al., (2018 in Zahro, Atika & Westhisi, 2019) also state that learning strategies that can be used in science learning include planning, implementation, and assessment. In planning, the teacher has prepared objectives, materials, media, and learning methods that will be used in delivering science material through literacy. The components of scientific literacy can be in the form of early literacy, initial literacy, library literacy, media literacy, technology literacy, and visual literacy. Zahro, Atika & Westhisi, (2019) also said that during the science learning process, teachers can communicate with children through pictures and orally about the natural phenomena that will be studied. The question and answer activity or discussion that occurs is a form of communication in the mother tongue which is the foundation for the development of basic literacy. When the teacher explains a natural phenomenon being discussed and the child is able to listen and retell what the child has done in a science experiment, this shows that the child fulfills the initial literacy potential.

b. Implementation of Science Literacy Learning in Children Aged 5-6 Years in Kindergarten Plus Al Hikmah

Based on the results of the study it can be concluded that scientific literacy can improve the scientific thinking skills of children aged 5-6 years at TK Plus Al Hikmah. The research results at each meeting have an effect on improving scientific thinking skills through scientific literacy.

Graph 1

Assessment of Scientific Development Indicators



1) Observing on Scientific Thinking Ability

Observing in this indicator means that students can collect relevant facts by using the senses of tools/materials, events, and showing interest in what is happening in class.

Based on research that has been carried out, the results of data analysis prove that curiosity in group B (age 5-6 years) TK Plus Al Hikmah, totaling 23 students, is in a fairly good category with a percentage score of 100% (scale 4) or called Developing Very good.

2) Classifying on Scientific Thinking Ability

Classifying in this indicator is meant for students to be able to mention the differences and similarities of an object.

Based on research that has been carried out, the results of data analysis prove that persistence in group B (age 5-6 years) TK Plus Al Hikmah, totaling 23 students, is in the fairly good category with a percentage score of 96.73% (scale 4) or is called Developing Very good.

3) Measures on Scientific Thinking Ability

Measuring in this indicator is meant for students to be able to take measurements using non-standard measures. For example using a glass to collect water in a small bucket and calculating how many glasses of water are needed to fill the bucket.

Based on the research that has been carried out, the results of data analysis prove that critical thinking in group B (age 5-6 years) TK Plus Al Hikmah, totaling 23 students, is in the fairly good category with an achievement of a percentage value of 83.69% (scale 4) or called Very Well Developed

4) Communicating on Scientific Thinking Ability

Communicating in this indicator means that students are able to tell facts based on events or incidents that occurred.

Based on research that has been carried out, the results of data analysis prove that critical thinking in group B (age 5-6 years) TK Plus Al Hikmah, totaling 23 students, is in the fairly good category with a percentage score of 96.73% (scale 4) or is called Very Well Developed.

5) Interpretation of Scientific Thinking Ability

The interpretation of this indicator is that students are able to find patterns in a series of observations so that a conclusion can be drawn.

Based on the research that has been carried out, the results of data analysis prove that critical thinking in group B (age 5-6 years) TK Plus Al Hikmah, totaling 23 students, is in the fairly good category with a percentage score of 95.65% (scale 4) or is called Very Well Developed.

6) Predicting on Scientific Thinking Ability

Predicting in this indicator means that students are able to predict or predict including the skills to make predictions about something that has not happened yet.

Based on the research that has been done, the results of data analysis prove that scientific thinking in group B (age 5-6 years) TK Plus Al Hikmah, totaling 23 students, is in a fairly good category with a percentage score of 91.30% (scale 4) or is called Very Well Developed.

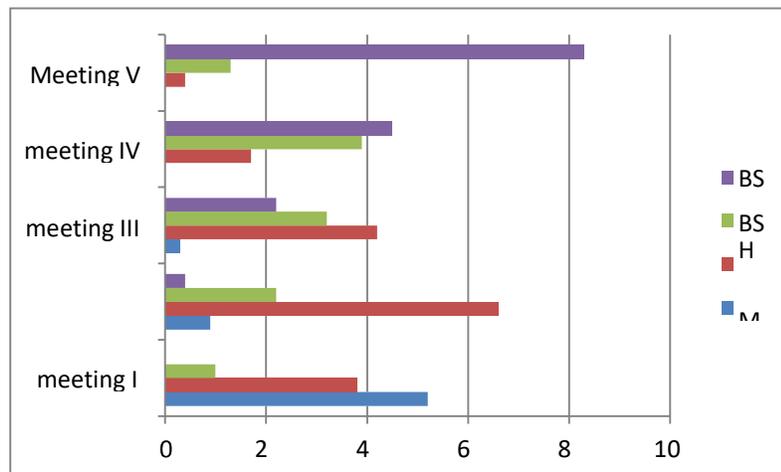
7) Asking Questions on Scientific Thinking Ability

Asking Questions in this indicator is intended is students are able to ask questions about what, why, and how.

Based on the research that has been carried out, the results of data analysis prove that critical thinking in group B (age 5-6 years) TK Plus Al Hikmah, totaling 23 students, is in a fairly good category with a percentage score of 98.91% (scale 4) or is called Very Well Developed.

The increase in student assessment criteria based on meetings one to five is as follows:

Graph 2

Results of the Level of Achievement of Each Meeting

From the data in the graph above, it can be seen that the increase in score Developing According to Expectations at the first meeting was still in the 0 category, increasing to 4.34% at the second meeting, increasing again at the third meeting to 22.36%, there was another increase at the fourth meeting to 44.72%, and at the fifth meeting it became 82.60%.

From the results contained in the graph above, it shows an increase in understanding of scientific thinking abilities of children aged 5-6 years in Kindergarten Plus A Hikmah. It is proven according to the theory according to Handayani & Srinahyanti (2018) about the nature of learning science, not only concepts, but also processes and attitudes. Science activities in early childhood are more emphasized on processes, therefore indicators of scientific literacy also refer to science processes. Early childhood friendly science process is to provide challenging real experiences through the application of science process skills so as to facilitate children's curiosity by presenting interactive, varied and fun learning. Science process skills are basic skills in implementing science literacy that are friendly to early childhood. Process skills consist of a number of basic skills which cannot be separated from each other.

2. The response of group B kindergarten teachers and students to learning scientific literacy in improving scientific thinking skills

Student responses to learning include positive responses and negative responses. Positive responses were known from the statements of students who expressed pleasure in learning activities. Students are given the opportunity to ask questions, carry out activities simultaneously or take turns, criticize the work of friends, the learning atmosphere is fun and the teacher is happy to respond to student questions. Student responses related to higher relevance of attention, satisfaction and self-confidence. The relevance in question is the consistency of learning material with student learning goals, suitability with student learning methods, and usefulness in student life.

This indicates that the learning being taught is in accordance with the learning objectives,

the teaching style expected by students and has benefits in students' daily lives. According to Abidin (2006: 149), when the teacher explains the knowledge to be learned and can be applied in everyday life, it will help students in the learning process. Another thing that indicates that the learning being taught makes students enjoy and are interested in learning because the teacher invites students to make observations so that students see firsthand and feel the learning process; explore curiosity because learning has a problem and make students more active in learning because they can discuss with other friends.

Learning scientific literacy for students is also shown by children having the ability to solve the problems they face through learning scientific literacy, so that children are helped and become skilled in solving various things they face. The development of science learning in early childhood is shown so that children have scientific attitudes. For example, they are not quick to make decisions, they can see things from various perspectives, they are careful about the information they receive, and they are open.

Scientific literacy learning can be followed by one of them with the demonstration method. Through demonstrations, it is hoped that children will be able to recognize the implementation steps. Often the demonstration method is used because the teacher has difficulty explaining with words alone. The benefits of the demonstration method can be used to provide illustrations in explaining information to children, can help improve children's thinking, especially children's thinking in increasing the ability to recognize, remember, convergent thinking and evaluative thinking. While the purpose of this method is imitation of the model being carried out. So that children can imitate the examples of actions demonstrated by the teacher.

This is in line with research conducted by Yuniarni (2016) where the increase in the ability to recognize simple science in children after learning through demonstration methods includes: children are very enthusiastic and active in getting to know various kinds of solid objects and liquid objects that can float and sink. This can be seen from the number of children who ask questions, the nature of observing, and children who like to carry out simple experiments related to science according to the stage of development of the child at the level of maturity in the child.

3. Obstacles experienced by class teachers in implementing Science Literacy learning

Based on the results of the research, as the researchers have stated above, it shows how the constraints experienced by class teachers on learning scientific literacy. The following is an analysis of the constraints experienced by teachers in science literacy learning classes, including the following.

The activity stage is the core stage which certainly raises obstacles when learning takes place. The visible behavior of the child is impatience, and often criticizes when the teacher is explaining and even the child's attitude is seeking attention even though learning is in progress.

The problems of kindergarten children put forward by Suranata and Sulastri (2010 in Na'imah, 2020) are as stated by the teacher, but it needs to be studied on the basis of whether the problem is a problem or reasonable behavior, potential behavior towards problematic behavior, or indeed behavior. problem behavior. The conclusion found is that in essence the "problem" raised

by the teacher and parents is a normal behavior for a kindergarten child who is in a period of growth and development. Furthermore, if this behavior is always displayed by children, then this behavior will lead to problematic behavior. And coupled with the opinion of Arianti (2017) implementing the learning process in class, the teacher apart from being an educator, mentor and director as well as a motivator who is responsible for the overall development of student personality. In other words, the teacher as an educator must not only be able to create a conducive and meaningful learning process according to the learning method used, but also must be able to increase the attention and interest and motivation of students to follow lessons and help students use it as a learning opportunity, resource and media.

So far, science learning is seen as a difficult learning and requires a lot of material and quite extensive knowledge. Moreover, knowledge of science is very close to Natural Sciences (IPA). PAUD teachers prefer learning that does not require a lot of reasoning and is in accordance with the conditions of children who are still unable to reason further. The teacher's knowledge of science learning is still low so that it is less attractive and children do not gain much experience about science. And there is still a lack of teacher creativity in implementing scientific literacy learning, so that the media to be used is difficult to obtain.

Science literacy learning activities are also still fixated on the examples in the book, making it difficult for teachers to teach science. Because in some of the reference books used by the teacher, sometimes the tools and materials included in the book may not necessarily be in school.

From the results of interviews the teacher explained the difficulties in organizing students to participate in science activities. Especially if one teacher has to control more than 20 students in one study group. Therefore teachers tend to apply science as additional learning that can be done, and also does not have to be done. And it can be said that class groups are also not ideal where it should be 1: 15, where 1 class teacher and 15 students or add 1 accompanying teacher in a class that has 20 student capacities so that learning including scientific literacy learning activities can run well and not too troublesome.

The quality of learning is a measure that shows how high the quality of interaction between teachers and students that occurs in learning places (classrooms) to achieve learning goals. This interaction involves teachers and students in a certain environment with the support of certain facilities and infrastructure. Thus the success of the learning process or the quality of learning is very dependent on teacher competence, student competence, learning facilities, class environment, and class climate.

Qualitative research requires quite a long time to be able to understand, interpret and analyze the subject's behavior patterns, so that accurate and in-depth data can be obtained. This research is limited to the focus of teacher and student activities in a series of learning processes. In fact there are still many things which are a series of learning processes that form a learning pattern, such as: tools or media used in learning, competencies to be achieved, characteristics of children and others that are not disclosed in this study, so the results of this study are not in-depth. For this reason, other studies related to learning patterns are needed. In addition, there is a lack of time and

energy during research, due to the relatively short research time due to being cut off by the COVID-19 pandemic so that researchers have not been maximal in digging up existing data.

CONCLUSION

Based on the research that has been done regarding improving scientific thinking skills through literacy learning, the role of the teacher as educator, teacher, mentor, learning manager, and model. This can be seen when the class teacher prepares activities according to the learning objectives and in accordance with the lesson plan. Lesson plans that are implemented are not only in the form of theory, children do direct learning where they carry out real activities such as cooking classes, floating and sinking, experimenting with writing with candles (secret messages), and many more. Teachers are also very concerned about learning materials with the characteristics and interests of children. Furthermore, getting a positive response from children when doing science literacy learning, children seem active in following it and really like it. Children are also given the opportunity to ask questions, carry out activities simultaneously or take turns, and criticize the work of friends. As for dealing with obstacles when learning scientific literacy, such as children often showing strange attitudes to divert attention, children forget class rules, children cannot be silent when learning, or children can't wait in line, what the teacher does is remain calm in dealing with this situation, when the teacher acts no matter how big.

REFERENCES

- Abidin, Z. (2006). Motivasi dalam strategi pembelajaran dengan pendekatan 'ARCS'. *SUHUF: Publikasi Ilmiah UMS*, 18(02), 143-155
- Arianti, A. (2019). Urgensi Lingkungan Belajar yang Kondusif dalam Mendorong Siswa Belajar Aktif. *Didaktika: Jurnal Kependidikan*, 11(1), 41-62.
- Handayani, P. H., & Srinahyanti, S. (2018). Literasi Sains Ramah Anak Usia Dini. *Early Childhood Education Journal of Indonesia*, 1(2), 46-51.
- Heriyanto, H. (2018). Thematic analysis sebagai metode menganalisa data untuk penelitian kualitatif. *Anuva: Jurnal Kajian Budaya, Perpustakaan, dan Informasi*, 2(3), 317-324.
- Huryah, F., Sumarmin, R., & Effendi, J. (2017). Analisis Capaian Literasi Sains Biologi Siswa Sma Kelas X Sekota Padang. *Jurnal Eksakta Pendidikan (JEP)*, 1(2), 72-79.
- Kemendikbud. (2017). Materi Pendukung Literasi Sains. Jakarta: Kementerian Pendidikan dan Kebudayaan Republik Indonesia. Diakses 08 Agustus 2022 pada <https://gln.kemdikbud.go.id/glnsite/wp-content/uploads/2017/10/cover-materi-pendukung-literasi-sains-gabung.pdf>
- Moleong, L. J. (2016). *Metodologi Penelitian Kualitatif Edisi Revisi*. Bandung: PT. Remaja Rosdakarya.

- Mirawati, M., & Nugraha, R. (2017). Meningkatkan Keterampilan Proses Sains Anak Usia Dini Melalui Aktivitas Berkebun. *Early Childhood: Jurnal Pendidikan*, 1(1), 13-27.
- Na'imah, A. V. K. (2020). Analisis Problematika Prilaku Perkembangan Anak Usia Taman Kanak-Kanak. *Bunayya: Jurnal Pendidikan Anak*, 6(2), 111-113.
- Nugraha, A. (2008). *Pengembangan pembelajaran sains pada anak usia dini*. Jakarta: Depdiknas.
- Pertiwi, U. D., Atanti, R. D., & Ismawati, R. (2018). Pentingnya Literasi Sains Pada Pembelajaran IPA SMP Abad 21. *Indonesian Journal of Natural Science Education (IJNSE)*, 1(1), 24-29.
- Pratiwi, S. N., Cari, C., & Aminah, N. S. (2019). Pembelajaran IPA abad 21 dengan literasi sains siswa. *Jurnal Materi dan Pembelajaran Fisika*, 9(1), 34-42.
- Rijal, M., & Sere, I. (2017). Sarana Berfikir Ilmiah. *Biosel: Biology Science and Education*, 6(2), 176-185.
- Wulandari, R. (2017). Berpikir ilmiah siswa dalam pembelajaran IPA untuk meningkatkan literasi sains. *SEJ (Science Education Journal)*, 1(1), 29-35.
- Yuniarni, D. (2016) PENINGKATAN KEMAMPUAN PENGENALAN SAINS SEDERHANA MELALUI METODE DEMONSTRASI DI TK KRISTEN MARANATHA PONTIANAK UTARA. *Jurnal Pendidikan dan Pembelajaran Khatulistiwa*, 5(2).
- Zahro, I. F., Atika, A. R., & Westhisi, S. M. (2019). Strategi pembelajaran literasi sains untuk anak usia dini. *Jurnal Ilmiah Potensia*, 4(2), 121-130.