

The Role of Teachers in Facing the Challenges of Beginning Mathematics

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Abstract

This study aims to describe the role of teachers in facing the challenges of early mathematics learning in early childhood so that can be one of the teacher's reference sources in teaching beginning mathematics. This research is a literature study through the stages of problem formulation, literature searching, data evaluation, analysis, and interpretation. The analysis technique that is used is descriptive analysis. For finding out the role of teachers, teachers should first pay attention to the principles of early childhood learning by considering the characteristics of early childhood. The teacher's role can be concluded from this article through three stages, namely the role of the teacher in planning, the role of the teacher in implementation, and the role of the teacher in evaluating. At the planning stage, the teacher prepares a learning tool that is adjusted to the child's characteristics and learning principles. At the implementation stage, the teacher is a facilitator. Whereas at the evaluation stage, the teacher reviews the material that has been given by the child with the planned tool can be in the form of making a community and workshop to share and find solutions to problems.

Keywords: *Early Mathematics; Early Childhood; The Role of The Teacher.*

Abstrak

Penelitian ini bertujuan untuk mendeskripsikan peran guru dalam menghadapi tantangan pembelajaran matematika permulaan pada anak usia dini sehingga dapat menjadi salah satu sumber acuan guru dalam mengajarkan matematika permulaan. Penelitian ini merupakan studi literatur melalui tahap formulasi masalah, pencarian literatur, evaluasi data, analisis, dan interpretasi. Teknik analisis yang digunakan yaitu analisis deskriptif. Untuk mengetahui peran guru, sebaiknya guru terlebih dahulu memperhatikan prinsip pembelajaran anak usia dini dengan mempertimbangkan karakteristik anak usia dini. Adapun peran guru yang dapat disimpulkan dari artikel ini melalui tiga tahapan yaitu peran guru dalam perencanaan, peran guru dalam pelaksanaan, dan peran guru dalam mengevaluasi. Pada tahap perencanaan guru mempersiapkan perangkat pembelajaran yang disesuaikan dengan karakteristik anak dan prinsip pembelajaran. Pada tahap pelaksanaan guru sebagai fasilitator. Sedangkan pada tahap evaluasi guru mengulas materi yang sudah diberikan anak dengan perangkat yang telah direncanakan dapat berupa membuat komunitas dan lokakarya untuk saling berbagi dan menemukan solusi dari permasalahan.

Kata Kunci: *Matematika Permulaan; Anak Usia Dini; Peran Guru.*

INTRODUCTION

Early childhood is an individual who is undergoing a process of development with a rapid and fundamental to the next life. The learning process given to children must pay attention to the characteristics possessed at each stage of child development. Children have certain characteristics that are unique and different from adults. Children are always active, dynamic, enthusiastic, and curious about what is seen, heard, felt as if they never stop exploring and learning (Pangastuti, 2019).

Early childhood is often also referred as the golden age because, at this time, all aspects of child development can be quickly and easily stimulated where the child is easily accept, follow, see, and hear everything that is exemplified, heard, and demonstrated (Fauziddin & Mufarizuddin, 2018; Maulana et al., 2020; Rekysika & Haryanto, 2019; Uce, 2015). If at that age children do not get maximum stimulation, it will result in the child's potential not to develop optimally.

Learning in PAUD considers 6 aspects in each lesson (Kementerian Pendidikan, 2015). One of the aspects that are always devolving and used in the learning is the cognitive aspect. Where cognitive aspects consist of math and science. Both of these topics have relationships and integration that can enhance students' understanding of mathematical concepts and contexts in everyday life. (Zulkardi, 2013). One of the subjects in terms of cognitive aspects that is important to learn is mathematics (Sulistiyorini, 2016). However, when this teaching mathematics are held at various PAUD institutions sometimes does not correspond to the stages of development of children and tends to occur errors in its implementation

Mathematics learning conducted at institutions often experiences coercion (Mirawati, 2017). Mathematics learning does not pay attention to the principles of early childhood learning and does not consider the characteristics of early childhood (Maragustam, 2017). Ace Suryadi stated that learning to understand the concepts of addition and subtraction, writing, and arithmetic in early childhood/kindergarten is one of the biggest mistakes and has a negative impact on children's

development (Lisa, 2017). For example, children are taught number 7 without using concepts, namely, the first-day children are taught $3 + 4 = 7$. Then, $5 + 2 = 7$. And the next day $6 + 1 = 7$. Children feel something is not right. From these illustrations, students can be said not to understand the nature of number 7 (seven) (Adjie et al., 2020). On learning the introduction of the concept of mathematics on numbers using a model of learning conventional overemphasize the function of the teacher as a messenger of information. Students only passively listen to the teacher's explanations without being actively involved in learning. The explanation of mathematical concepts has been set up in such a way by the teacher. This causes the mastery of students' concepts to be weak because what happens is the process of transferring knowledge rather than finding knowledge (Cahaya & Suryaningsih, 2016). Sometimes, teachers do not understand the beginning of mathematics learning that should be so that in learning the teacher only teaches beginning mathematics in the form of addition and subtraction and only introduces numbers (Zafirah et al., 2015). In addition, teachers are also demanded by parents who expect their children to have calistung in order to pass the elementary school entrance test (Lutfatulatifah & Yuliyanto, 2017). Even so, there should be an appropriate way and in accordance with the stages of child development.

Mathematics has a broad scope. The scope of mathematics for children in PAUD is certainly not as broad as the scope of mathematics for children at the level of education after PAUD. The scope of mathematics for young children is only limited to beginning mathematics with numbers, algebra, geometry, measurement, analysis, and probability. This is where the teacher's first role in teaching beginning mathematics for children. So, this article will examine how the role of the teacher teaches mathematics in early childhood. Based on the explanation above, the formulation of the problem in this study is How the teacher's role in facing the challenges of beginning mathematics learning in early childhood that aim to find out the teacher's role in teaching early mathematics in early childhood.

METHOD RESEARCH

This article will discuss the role of teachers in teaching early mathematics in early childhood so that it can be one of the sources of reference in teaching beginning mathematics for teachers. The method used in this research is the study of literature. According to Susilo & Widodo (2018), there are stages in the study of literature namely problem formation, literature search, data evaluation, analysis, and interpretation. The first stage is the problem formulation, the problem formulation is done by compiling the problem formulation that is how to describe the role of the teacher at the beginning of mathematics learning. Furthermore, the second stage is searching for literature in the form of primary reference sources (journals, research reports, thesis, dissertations, and proceedings papers) and secondary reference sources (books and internet sources). The third stage is the evaluation of data was conducted to identify the data corresponding to the issues discussed. The fourth stage is analyzing the data to answer the formulation of the problem. The last stage is the interpretation that is done to get conclusions from data analysis. While the analysis technique used is descriptive analysis.

RESULT AND DISCUSSION

Child Characteristics and Learning Principles

Early childhood is a child who has certain age restrictions, unique characteristics and is in the process of development for readiness in the next life. According to the Ministry of Education (2015), children categorized as early childhood education are shown to children from birth to age 6 years. This is different from the National Association for Education of Young Children (NAEYC), children categorized as early childhood education occurs during the first 8 years of a child's life, which is 0-8 years. The difference between the ranges of early childhood is caused because in Indonesia aged 0-6 years children are categorized into preschool children where children do not have special obligations for formal schooling. However, children are advised to attend preschool to prepare themselves and train children to continue to compulsory schooling.

Characteristics of early childhood is a characteristic or characteristic that is shown by children. Teachers should be able to recognize the characteristics of their students that can facilitate teachers in dealing with these children, both in learning activities or in applying them in the school environment. Early childhood has unique characteristics and is different from adults. These characteristics are characteristics of the child's growth and development process for the next life. The characteristics of early childhood in accordance with the Ministry of Education (2015) namely:

- a. Egocentric
This trait is characterized by children assessing things with their own angles and interests.
- b. Curiosity
This is marked by the child's interest in something that is considered unique so that it attracts his attention. The higher the child's curiosity, the more knowledge he gets.
- c. Unique
This is characterized by nature, innate, interests, capabilities that differ from one another.
- d. Happy to imagine and fantasize
This is marked by the child asking about something that cannot be guessed by adults.
- e. Has a short concentration power
It is characterized by the child quickly distracting from the activities given, the child feels bored when the activities provided are not interesting.

In addition, we know the characteristics of early childhood. It is also important for us to know the principles used in the learning process. Where the principle is a guide that can be done by teachers in thinking and acting for the development of their students. The principles used in the process of early childhood learning (Ministry of Education, 2015) are as follows:

- a. Learning through play (learning mathematics is presented in a fun game)
- b. In accordance with the child's development (developing aspects of development according to STPPA)
- c. According to the child's needs (providing stimulation according to the child's needs)

- d. Child-centered (encourages enthusiasm for learning, motivation, interest, creativity, and independence according to characteristics)
- e. Actively learning (creating an atmosphere that encourages active children in learning)
- f. Development of character values (learning not only emphasizes material but also shapes student character) (Aisyah et al., 2019)
- g. Life skills development (through learning, habituation, and example)
- h. Supported by a conducive environment (attractive, fun, safe, and comfortable)
- i. Democratic learning (developing mutual respect between children and teachers and between children and other children)
- j. Use of learning media, learning resources, and resource persons (aiming at making learning more contextual and meaningful)

In addition, NCTM (2020) also states the principles of mathematics learning:

- a. Equality (providing adequate opportunities and support regardless of personal background)
- b. Curriculum (building or developing teaching around big ideas both in the curriculum, students must see mathematics as something whole rather than separate)
- c. Teaching (teachers must understand mathematics to be taught, how students learn mathematics)
- d. Learning (understanding concepts and expressing ideas and ideas)
- e. Assessment (get information about student development and understanding so that the teacher can make better decisions that support student learning)
- f. Technology

Child Development Aspects

Learning in Early Childhood Education (PAUD) is different from learning in advanced schools. Learning mathematics in PAUD emphasizes the relationship of mathematical concepts with children's everyday experiences (contextual). Learning mathematics in PAUD, presented with play activities and fun for children to be motivated to learn. To follow up on misconceptions of cognitive abilities that should be

taught in early childhood, a teacher should understand the aspects of children's cognitive development that are clear in understanding and implementing these learning. Aspects of children's cognitive development based on their level of development include learning and problem solving, logical thinking, and symbolic thinking. In this article, we will only focus on the level of development of symbolic thinking for ages 5-6 years.

At the development level of symbolic thinking, there are 3 out of 5 achievements related to mathematics. These three achievements are: mention the symbol numbers 1-10, use the symbol numbers to count, and match numbers with symbol numbers. It turns out to achievement at the level of symbolic development related to material numbers.

Numbers are the first material that is introduced to children before going to the next material. The mastery stage of early mathematical concepts can be started from the language used should be simple language and take examples of materials and objects that are closest to the child's environment (contextual). As expressed by (Nemeth, 2017), familiar objects and situations add meaning to any math exploration and help all children understand and use what they've learned. Where objects or situations that are around students can provide mathematical meaning and can help students understand what they are learning. Besides that, the use of contextual may be practiced students at home so that adds to the memory of the students will be learning it. After learning begins with the object of concrete and then bit -by- bit can download g instead by using images (Rekysika & Haryanto, 2019). If this matter is further studied is the same as the PMRI approach. PMRI is an approach that starts from contextual to formal (Zulkardi et al., 2020).

There are three stages that children go through in learning numbers, namely mastery of concepts, transition periods, and symbols. Mastering the concept implanted understanding or understanding of something using concrete objects and events, such as the introduction of colors, shapes, and counting objects or numbers. During the transition period, there is a transition from a concrete understanding of the introduction of abstract symbols, where concrete objects still exist

and begin to be introduced to the shape of the symbol. Furthermore, the symbol stage can be a visualization of various concepts. For example symbol 7 to illustrate the concept of number seven and activities that can introduce numbers to children can be through singing or playing hide and seek and

jumping rope. It can be seen in the relationship between the material, learning theory, the level of development, and activities that can be done through Chart 1.

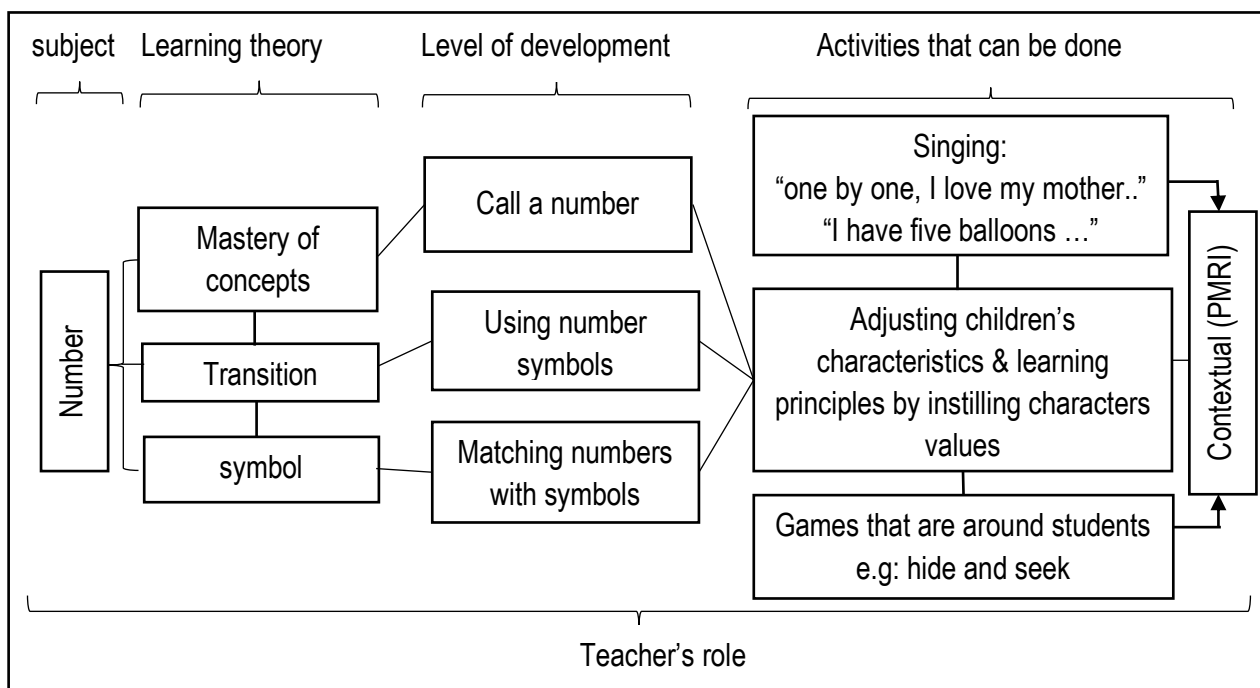


Chart 1. Relationship between material, learning theory, level of development and activity

From chart 1, we can know that in making planning teachers should understand the material to be taught must consider learning theory and the level of child development by adjusting the characteristics of children & learning principles by instilling character values. All stages can be started by using objects or contextual situations. Through this chart, the teacher can place his role in teaching beginning mathematics to early childhood.

The Role of Teachers in Early Mathematics Learning

Introducing the beginning of mathematics to children is required to be in accordance with the way of thinking of the child so that it can be understood and not confuse the child, but also not to get out of the context of mathematics itself (Wardhani, 2017). Mathematics lessons must be fun. Making mathematics a part of life is the right step. By loving mathematics, it can make children's analytical skills sharp. In understanding the beginning of mathematics for children, the role of a teacher is needed. The role of the teacher in helping children

understand the beginning of mathematics. According to Mirawati (2017), teachers must be able to consider carefully the learning process that will be given. This can be done through modification of informal games or stories, making activities that are culturally motivated, providing concrete experiences, providing communication-based on children's experiences, designing activities that instill concepts, involving real objects and various APEs (Maragustam, 2017; Mirawati, 2017; Novikasari, 2016; Nurkamilah & Arumsari, 2018). So, Wardhani (2017) suggests that teachers must have special skills. In addition, teachers can also create a community of teachers to share with each other (Cahaya & Suryaningsih, 2016). From a number of opinions regarding the role of the teacher, it can be concluded that the teacher has a role that can be divided into three stages, namely the role of the teacher in planning, the role of the teacher in implementation, and the role of the teacher in evaluating as shown in Chart 2.

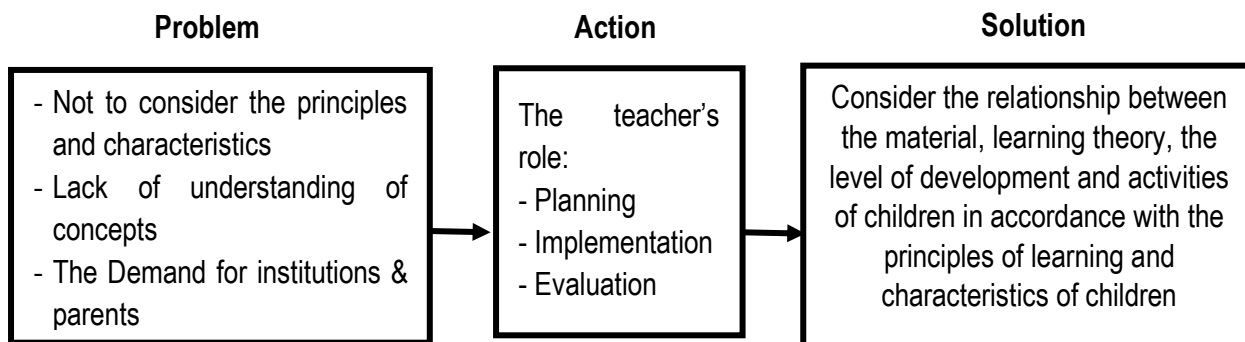


Chart 2. The Role of Teachers as Bridges Looking for Solutions to Overcome Problems

From Chart 2, it can be seen that the importance of the teacher's role in early mathematics learning. The role of the teacher as a bridge to seek a solution to the problem yan often we encounter. Here is the explanation of the role of teachers in accordance with the stages:

1. The Planning Stage

In the planning stage, the teacher should begin by instilling the mindset that mathematics is easy. Through the mindset that is embedded in the mind of the teacher can generate interest to explore the lesson. Then, the teacher prepares learning tools in the form of rps, rpph, methods, teaching materials, media, activities, and considers the learning process to be provided. Activities given must give children the opportunity to see, hear, feel, think, manipulate objects. These activities can be started with activities that are around students (contextual). Also, the equipment given to students is expected to vary so as to arouse students' enthusiasm and curiosity so as to avoid the characteristics of children who have short concentration power (bored in learning). In addition, teachers must also think about what learning is suitable by considering, comparing, and adjusting existing conditions so that children get an education in accordance with the standards, that have been given. If the learning has given is too demanding for the child's cognitive and not in accordance with applicable standards, the child will feel bored quickly and have consequences in the future. To avoid this, it is also necessary to instill character values in learning. Learning that is provided not only emphasizes the material but also build the character of students. Therefore, the teacher should design learning by making children play while learning by also instilling character values

in children so that children are implicitly given learning.

2. Implementation stage

In the implementation phase, the teacher acts as a facilitator which stimulates the growth of the child and not giving what the child does not know. The teacher must also be responsive in paying attention to the child when the child has shown a sensitive period (maturity) to calculate immediately providing services and guidance so that the child's needs can be met. So the teacher should think about what methods or methods that suit the child's needs by involving the child's activities.

3. Evaluation stage

In the evaluation phase, the teacher should review the material that has been given to children with the planned device. The teacher also can achieve the results of student work to be reviewed again. Through documentation can provide teacher motivation to revise the devices to come (McLennan, 2014). So, create a community to share and exchange ideas. Putri (2015) also suggested a workshop because workshops have potential effects that can help teachers to learn social norms in mathematics classes. So, Teacher could find solutions to problems from the implementation stage that is not in accordance with the planning stage and can also create new learning.

For overcoming the initial mathematical problems experienced by students today, it is necessary for the teacher's role in bridging the solutions to be achieved by considering the interrelationship between the material, learning theory, the level of development and activities of children in accordance with the characteristics of

children and learning principles that instill character values.

CONCLUSION

To find out the role of the teacher is facing the challenges of early mathematics learning, teachers should pay attention first to the characteristics of children and consider the principles of learning And understand learning standards both nationally and internationally. National learning can be seen through the Ministry of Education and Culture while international standards can be through NAEYC and NCTM. The teacher's role can be concluded from this article through three stages, namely the role of the teacher in planning, the role of the teacher in implementation, and the role of the teacher in evaluating. At the planning stage, the teacher prepares a learning kit that is adjusted to the characteristics of the child and the principles of learning in accordance with the reference standards and the child's condition. At the implementation stage, the teacher is a facilitator. While at the stage of evaluation of teachers to review the material that has been given a child with a device that has been planned to be made communities and workshops for each share and find the solution to the problem. To implement the teacher's role especially in the beginning mathematics can be presented by instilling character values through fun games that are around students (contextual).

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