The Role Of Teachers In Early Childhood Mathematics Play

Oktariani[1], Yuliani Nurani[1], Ade Dwi Utami[1]

[1]Department of Education, Universitas Negeri Jakarta, Indonesia

Abstract

The practice of early childhood education contains various content, one of which is mathematics content, in its application to early childhood the teacher plays a big role in developing this content to make it a fun mathematics activity, but based on field results found in one of the kindergartens in Maja subdistrict it shows that teachers do not know properly the appropriate mathematical content for children so that in practice teachers more often only introduce the concept of numbers and counting. Based on the problems found, the aim of this research is to examine and analyze the role of teachers in introducing mathematical content through mathematical play activities. Researchers use literature studies to review the role of teachers in introducing early childhood mathematics content through mathematical play activities. So, to describe the results of this research, the analysis qualitative descriptive method is the most appropriate method to use, so that we get results that show that the role of teachers in introducing mathematical content to children can be the fulcrum of children's understanding of mathematics, in the sense of good teacher ability in content and ability. teachers in developing mathematics content into mathematical play activities become the basis for creating meaningful and enjoyable mathematics play classes, so that mathematics play activities become a means of providing a deep understanding of mathematics to children in a fun way.
Keyword : The Role Of The Teacher, Mathematics Content, Play Activities

.

1. Introduction

In the practice of early childhood education, teachers are the most important resource and become the main foundation in practice, namely providing the best guidance and appropriate to the age of children so that it requires teachers to be able to analyze and assess every form of difficulty and encouragement in the process of early childhood education practice, this is certainly in line with (Law of the Republic of Indonesia No 14, 2005) Article 1 Paragraph 1 clearly explains that teachers are professional educators who have the main task of educating, teaching, guiding children, training, assessing, evaluating and also providing direction to students in taking education both in formal and non-formal education. So we can say that teachers are one of the most important human resources because teachers are the most important input in the implementation of early childhood education, where teachers have a big role in designing, developing models and providing innovations in the curriculum so that through innovation educational practices move in a better direction (Hapidin, 2014).

All of the duties of teachers above are certainly very closely related to the pedagogic competence of ECCE teachers, where teachers are required to master the material with various fun teaching strategies without eliminating the rights of the child himself, namely through play activities, just as teachers are required to master pedagogic play with the aim of presenting meaningful and fun scientific play situations, early childhood education teachers must be well aware that play in educational practices Early childhood is not just a mere strategy but teachers must be aware that it is through this play activity that children learn, through this activity children discover something new, and through play also encourage children's growth and development for the better, as stated by (Utami et al., 2020; Vygotsky, 1966) Vygotsky sees play from the point of view of cultural history as the most important activity in encouraging child development, because in play activities there is an imagination where each child will change every meaning of every object around him, not only Vygotsky who views bermian as the most important means according to Farten (Nurani, 2022) Also views the bermian activities carried out by children as a means of interaction, so it is hoped that through this play children have the opportunity to explore, find and express their feelings so as to make play a fun learning tool for each child. One of the play activities that can be done in early childhood education practice is playing mathematics.

Mathematics, widely applied in various educational units, one of which is the early childhood education unit (PAUD), according to *Maine's Early Learning and Development Standards* (Education & Services, 2015) Children are mathematicians, even as children they are often involved in matching and sorting objects, even children at the age of 3 to 5 years learn math content through their daily activities, so that children benefit from mathematics from the surrounding environment with the help of parents or other adults who introduce very important mathematical concepts and content to children. This is a fulcrum that should not escape our view that adults play a big role in supporting children in forming an understanding of mathematics on the basis of their curiosity and also the child's desire to learn, that is why mathematics is very very important to be presented in the practice of early childhood education because mathematics is also the main figure in helping the process of developing children's cognition, What children know about mathematics will be a picture

of children's reading achievement later so that it can be said that mathematics becomes the main figure in cognition (Clements & Sarama, 2020).

Mathematics for early childhood is certainly different from mathematics in adults, mathematics in early childhood must be packaged into a play activity that can encourage children to explore, find, solve problems, so that the child can provide solutions to the problems found where all of it can be done in math play activities, because good and quality mathematics learning for early childhood should allow children to experience mathematics firsthand as the child plays and explores his world (Clements & Sarama, 2020) . Math content for early childhood is also paritaif not focusing solely on number recognition or counting alone, according to NCTM (The National Council of Teachers of Mathematics, 2000) There are 7 mathematical contents that can be introduced to early childhood including, Number and Operation, Algebra, Geometry, Measurement, Data Grouping and Statistics, Estimation and Problem Solving Content. Of the many mathematics content that can be introduced to early childhood, in fact there are still many teachers who are not familiar with various mathematical content that can be introduced to children and the inability of teachers to package mathematics content into play activities, this fact is found in one of the kindergartens in Maja sub-district where every day children are only introduced to counting activities, Teachers more often invite to count pictures on paper making children easily bored, similar problems also exist in previous studies where teachers have difficulty developing mathematical play activities that are fun and suitable for children, one of which is research from (Sari et al., 2020) In learning mathematics content related to the concept of counting, educators use sticky media and fingers in the introduction of the concept of counting, but in fact this method is still not maximal in helping children in their counting skills because children are not interested and easily bored, (Whyte et al., 2018) His research involved 45 early childhood education teachers from different countries in his research explaining that when talking about pedagogical practice in mathematics learning practices for children teachers talk more often about numbers and few teachers talk about children the content of operations, geometry, measurement and algebra. There is also a problem in Studies conducted by (Ratna Dewi et al., 2021) Researchers see that children's ability to count is still low and one of the main factors is the teacher's inability to design learning media that is relaxing and when facilitated with animation media teachers have difficulty operating the media so that as a result teachers have difficulty in conveying the content of mathematics material, this illustrates that teachers have not been able to develop mathematical content into fun activities, Even though we already know together, one of the roles of ECCE teachers is to design fun math activities for children and one of them is by presenting learning media that interest children. Based on the findings above, it is interesting for researchers to dig deeper into how the role of teachers is really in playing mathematics, So to get answers and answer all the problems above, the researcher intends to analyze various literature, so that the results are expected to provide an overview of how the ideal role of teachers in playing early childhood mathematics and for future researchers it is hoped that this research can be one source of data in designing further research accompanied by various innovations.

.

2. Literature Review

2.1 Role of Early Childhood Education Teachers

When we talk about the role of teachers, especially in the scope of early childhood education, the role of teachers is very thick with Vygotsky's ZPD theory, which in the practice of education with any model a student will still need an adult in this case a teacher to be able to guide children to continue to move to wards more complex structures in their nearest developmental zone, This confirms that teachers become the foundation in helping the development of their students. Even in theory Vygotsky considered teaching a fundamental attribute for which teachers and pedagogics are unique centers of development and psychological centers (Daniels, 2016; Moll, 1990), the presence of pedagogics in the world of education further clarifies the role of teachers which is very important we can imagine if teachers do not make and do not educate children as pedagogic objects then most likely the child will not be able to develop like individuals who are knowledgeable and have competence, so it is not excessive if the pedagogic teacher is an art in teaching and learning activities (Daniels, 2016; Premack, 1984). Vygotsky's theory provides a very clear picture that the main component in the introduction of content, especially mathematics content, is the teacher, teachers have a big role in the process of early childhood education and in the process of mathematics practice teachers are required to continue to follow the development of the era where the use of ICT is very much needed in the current era, the progress of ICT must also be encouraged or accompanied by the progress of educators in teaching mathematics (Supriadi, 2018), the statement above is certainly in line with Permendiknas No. 16 of 2007 where one of the pedagogic competencies of teachers that must be mastered by an educator is to master the media used in mathematics learning practices both concrete media and ICT-based media.

In a study conducted by (Copur-Gencturk & Tolar, 2022) In mathematics learning activities the role and duties of teachers are very complex where teachers master correctly each component that supports the practice of learning mathematics, the component in question is that teachers understand the meaning and rules in mathematics, especially mathematics which is presented for early childhood, for example when teachers try to build concepts $3 + 2 = 5$ then teachers must also be able to build different concepts with the same results as $1 + 4 = 5$, Both produce the same amount but in different ways. The second component of the teacher's role is that the teacher analyzes every obstacle experienced by each child and helps children solve math problems. As for the third component, the role of teachers in mathematics learning practice is that teachers use simple mathematical language in helping children solve problems.

The task of teachers Early childhood education is certainly more complex where its role as an educator has its own challenges in mathematics learning practice as much as possible a teacher must be able to position himself as a planner, observe, become a model, facilitator, be an elaborator to become an evaluator (Ardi, 2021; Mulyasa, 2012), not only that teachers also have a role in understanding the relationship between teaching activities and play activities in mathematics practice in the sense of the teacher's ability to wrap mathematical content into a meaningful play activity (Stavholm et al., 2022; Then Fleer van Oers 2018; Pramling dan Wallerstedt 2019) and according to (Dooley et al., 2014, 9) a

teacher is very important to understand the practice of mathematics content and should be encouraged by the involvement of children in mathematics play activities by reflecting on them based on their mathematical experiences and interesting math play activities should arise from the child's interests, questions asked, attention given by teachers, and their daily experiences so that teachers can see and analyze obstacles as much as possible, children's encouragement and interest in maths and each child is given equal opportunities to explore maths further through a range of play activities designed with the teacher (MacDonald & Murphy, 2021) The above statements are certainly in line with Gage & Berliner (Li, 2006) From a progressive, student-centered perspective, the teacher is the most indefendent component of Education who serves as a facilitator of learning that assists each child in planning, designing and following the child's own interests, (Mursid, 2015) And to carry it all out optimally, teachers must also understand children's growth and development, until later in the practice of learning mathematics given according to their age and stages of development and to meet the needs of child development, as much as possible teachers are required to design comprehensive mathematical play activities in the sense that the activity must be able to cover all aspects of child development. All the tasks of the teacher's role certainly intersect with the teacher's own pedagogy and for Vygotsky pedagogics arise and exist in certain social spheres and Vygotsky's main contribution is to make education the basis of human activity so that teacher pedagogy becomes a central concept in the education system, making the teacher's role as the foundation of child development in learning in which a special interaction between children and teachers is formed (Dooley et al., 2014).

2.2 Playing Maths

Mathematics is one of the contents that is widely applied in various units of early childhood education, mathematics learning is dominated by various learning approaches that use constructivism theory, mathematics has a close relationship with various other content for scientific development especially in the scope of technology and science. Aristotle viewed mathematics as one of the basic sciences of science, he viewed mathematics obtained from the process of expression, observation and abstraction (Supriadi, 2018)**.** Although mathematics is seen as one of the sciences, in fact mathematics is a major need in everyday life and must be mastered by every individual, especially if mathematics for early childhood can be a means that can be introduced in training children's thought processes, thus helping children develop their various intellectual potentials (Delfia & Mayar, 2019)**.** Mathematics is one of the most important content to be introduced as early as possible because mathematics is a life skill that will continue to be needed and used in everyday life (Nisa & Halifah, 2021) That is why mathematics is seen as the most important science for human life, because in mathematics every individual is trained to solve problems ranging from simple to complex (Gunur et al., 2018)**.** Mathematics as a science that is neatly arranged, structured, logical, and systematically explains from very simple things to the stage of the most complex concepts, so that to be able to understand mathematics further, understanding the previous concepts in the simple stage is the main requirement, for that the role of the teacher ensures that all students master simple concepts first and then move on to the most complex concepts

(Supriadi, 2018)**.** However, in the process of early childhood education, mathematics learning must be presented with simple activities related to experiences, environments and habits that children do daily, as for mathematics that we can introduce to early childhood according to NCTM, including:

1. Number sence and operation Content

   The introduction of this content can basically be done when the child is less than 3 years old through simple activities that children usually do such as putting biscuits into the jar with the mother, and according to (Charlesworth Rosalind, 2011) This content can be introduced when children enter the pre-Kinderganten stage, more precisely at the age of 3 years, which is considered by children to be able to analyze numbers and even count in order. The concept of counting must be introduced in early childhood education because this activity uses reasoning, logic and numbers so as to train students' mathematical skills, but the concept of counting for early childhood does not emphasize unanimously children must understand number calculation operations, but what is more emphasized is that children understand daily life and live daily life through mathematics (Rohmalina et al., 2020). As contained in (Missouri Early Learning Standards for Social and Emotional Development and Approaches to Learning, n.d.) there is a standard process in introducing Number sence and operation Content

   Among them:

   a. The number in indicates the quantity

      Strategies that teachers can use in this case such as inviting children to experiment and asking children to count the number of materials to be used, involving counting activities in a song, inviting children to observe the classroom and giving children the opportunity to try to count the number of dolls in the corner of the room teachers can ask children how many questions, and many other activities such as playing counting games together.

   b. Use of Language to represent objects

      Strategies that teachers can use in children such as teachers choosing reading materials or story books that contain the concept of counting during reading activities, inviting children Together to identify something, inviting children to make bracelets and talking about how children classify the beads used and how many beads are used, teachers can also invite children to sing songs using their fingers and count Together through songs that children like, or the teacher asks a simple question before eating the biscuits in his jar, biscuits in the teacher's jar there are only 12 pieces whether these biscuits are

enough if they are distributed to all students in a class of 12 people and how many biscuits each student gets, these simple questions can be asked by the teacher before recess and meal activities

c. Troubleshooting involving numbers

In this standard a strategy that teachers can use such as teachers taking advantage of natural situations such as the child being asked to name how many friends were present in class today? How many girls and how many boys? Then the teacher can ask the child to compare the attendance of children in the class more boys or girls, the teacher always involves the child in decision making for example When going to name their class with the names of animals, the teacher can also invite children to solve problems Together like the teacher has 6 pieces of biscuits but the number of students in the class there are 12 how to get each student can get all the biscuits and how many biscuits can be obtained any child?.

d. Use numeric representation

There are activities or strategies that teachers can use such as inviting children to make certain numbers or objects according to the specified amount with plasticine or clay media, giving children the opportunity to experiment and write numbers, and many other activities.

2. Algebra

In the previous discussion, the author has briefly explained related to Number sence and operation Content, which turns out in the Dodea curriculum (*DoDEA College and Career Ready Standards for Mathematics CCRSM Grade Kindergarten*, 2015) Operations and numbers are still juxtaposed with algebraic content or called , this content understands content that addition as uniting, and understanding subtraction as separating or taking while according to (*Missouri Early Learning Standards for Social and Emotional Development and Approaches to Learning*, n.d.) Explain that this content displays the ability of students to identify patterns, When children pay attention to patterns that exist in their environment, children automatically also begin to design and make patterns in different ways so as to build the concept of algebraic thinking children match the patterns they see, regrouping based on certain characteristics. In line with the above opinion (Astuti et al., 2021) The introduction of algebra in early childhood can be done through their daily activities in simple activities that teachers can do such as starting with activities to select or sort toys, then classify toys based on certain characteristics can also be invited to compare toys that

are large and small, then teachers can invite children to arrange toys that have been classified based on shape, number, color, properties and so on. Through algebra teachers can also introduce patterns and ask children to describe simple patterns, and expanding patterns will contribute to children's understanding of classing.

3. Geometric

Geometric content is widely applied in various units of early childhood education, but in fact not many also know that geometry is part of the mathematics content, When children are introduced to geometry content by sharing shapes such as circles, cylinders, squares, triangles, and so on When teachers introduce the concept of geometry to children, not only introduce shapes but children can understand their position in a space that is connected to the environment in the world. Around it, for example, children understand the book is on the table, shoes are below and the miannya is next to it, children also understand the object has a short distance or even far, concepts like this can be introduced to children through play activities by observing the surrounding environment (Putri & Suparno, 2020). While according to (Pensylvania State Department of Education & Pensylvania State Department of Human Services, 2014) Geometry content can be introduced to early childhood with two scopes, namely children identifying geometric shapes and applying geometric shapes. When early childhood is introduced to geometry content (Michigan State Board of Education, 2005) Children can build visual thinking by observing the surrounding environment, such as children are able to make models or pictures with geometric shapes then children communicate the images they make, pictures made by children then children identify how if the position of the picture is changed or between one shape combined with another shape it will be like, children identify various geometric shapes in their environment and understand the direction or the position of the geometric object he observed.

4. Measurement

Measurement content in NCTM (The National Council of Teachers of Mathematics, 2000) explained that measurements in early childhood are divided into two, namely standard measurements and non-standard measurements, meaning that it is not based on the tools used but rather on children understanding the concept of longer, slower, farther, higher, cooler with the help of measuring instruments around children examples for non-standard such as the use of ropes or ribbons, While assistance for standard measuring instruments such as stopwatches, rulers, thermometers

5. Data collecting and Statistic

As contained in (NCTM, 2006) Where the content of data collecting and satistic is divided into 2 which are adjusted to the age and stages of children, at the stage Prekindergarten Where children are introduced and learn the basis of data analysis using objects or media they identify where this content is still related to geometry and measurement content. For example, children are invited to sort geometric shapes based on

color, weight or shape, while for the Kindergarten stage children will be given the task of sorting, and grouping objects one or even more than one object to solve problems. The strategy or role of the teacher in creating play activities Data collecting and statistics such as, Asking some questions to children in order to encourage children to be able to collect various information, teachers give children flexibility or opportunities for each child to be directly involved in sorting and calibrating objects then give children questions about how children do it. Teachers can also use their interests to ask various questions for example When many children talk about their sapatu pavorit collection, then teachers can ask children what kind of shoes do they have? What color shoes they like the most, from that activity teachers and students can Together create charts and graphs to classify children's shoe collections based on color and from charts that have been designed Together invite children to read data from the garfik by asking various critical questions to children. The above activities are also in line with content standards for content Data collecting and Statistic dari Curriculum Focal Points For Mathematics Prekindergarten Through Grade 8 (NCTM, 2006) Among them are:

a. The teacher asks the child questions and invites the child to collect data about themselves and their environment
b. invite children to jointly sort and classify objects based on certain characteristics and design data related to these objects
c. Create data using concrete media, images, and design graphics
d. Read the data that has been created

6. Estimation

Estimation content always intersects with other content such as geometry and algebra, according to (Kennedy & Johnson, 2007) Estimation in the world of education is a guess that has an educational basis that contains various information and knowledge. This content is commonly used by teachers in math play activities and other content generation, and this estimation content is also easily understood by children. The estimation content standards that teachers can do in applying this estimation content according to Pensylvania State Department of Education & Pensylvania State Department of Human Services (2014) activities carried out by teachers in carrying out their duties such as Together invite children to consider which tools can be used to dig the ground between shovels and hammers, then teachers can also invite children to count the number of shovels and hammers available, to encourage children to think critically teachers can ask questions to children by building scientific arguments such as why hammers cannot be used to dig the ground? Why can only use a shovel? Is there any other object that we can use to dig the ground besides a shovel?, the teacher has a big role in building the argument of each child so that children are accustomed to thinking critically understanding the concepts and causes and effects of simple things they encounter in everyday life.

7. Problem solving

This problem-solving content is always side by side with all other mathematics content and other content such as science and technology, this problem solving content is considered

the most important content in early childhood education and this content is considered the heart of mathematics (Gunur et al., 2018). In the practice of problem solving content, in the early stages the teacher can be directly involved and involve daily activities or children's experiences until the mathematical stage arises naturally, so that's when the teacher can see and analyze the way children think in solving their problems, this helps the teacher so that later when the teacher will create math play activities, the teacher already has a basis for analysis and prepares appropriate activities for children.

All the content that has been described above can certainly be introduced to early childhood by creating fun play activities for children or we can call playing mathematics. When talking about play, people will view play for early childhood as mere fun without seeing that play is one of the activities encouraging children to learn and get more benefits, but unfortunately many adults around children do not know or even do not realize the lot of involvement of mathematics in play activities carried out by children, Many teachers do not recognize and understand this natural involvement that arises from a child's interest resulting from his exploration. Vygotsky (Nurani, 2022) Believing that play activities carried out by early childhood can encourage children's cognitive development directly in a better direction, Vygotsky emphasized that through symbolic play activities carried out have a very important main role in abstract thinking, one example is when children do role play or imaginative play, children will automatically think about the meaning of the object represented. In line with Vygotsky's ZPD theory, which believes that play contributes greatly to a child's cognition, social and emotional development and that all three developments can improve overall when children role-play or imaginative play, Bruner said (Tedjasaputra, 2001) Also has a similar view with Vygotsky that play activities help children to develop their cognitive development, this is because through this play activity children are required to be able to solve problems encountered with their experiences so that Bruner created a narrative mode of thinking that connects the meaning of experience and children's imagination. Ideal mathematics learning for early childhood is where natural learning of mathematics appears in play activities or in a game and the child's interest in mathematics contributes to the stimulation of the child's cognition (Dooley et al., 2014; Seo & Ginsburg,2004), this is certainly in line with NCTM (Figueiredo et al., 2018) Those who provide opinions and give suggestions in the practice of learning mathematics content should be packaged in a simple but fun way that is presented naturally from children's play activities by doing various explorations so that it automatically forms children's ideas and understanding of mathematics through these activities.

Simple math play activities carried out by children (Nurani, 2022) such as inviting children to play creation on objects, hearing and reading serial stories, creative questions, creative movements, and playing dramas. Although mathematics learning must be presented with play activities, the fact is that in Indonesia the play activities carried out are still structured, when compared to developed countries they use play activities in a fun and flexible manner and initiated by the children themselves (Utami, 2023) This is because they believe that in play activities become a satisfying and exciting means for children, children flexibly explore and experiment in the world of play (Huda, 2019; Gordon & Browne, 2014) and the role of teachers in this math play activity (Fleer, 2015) Teachers are required to be directly involved in children's play activities and their role in these play activities is to encourage children to continue to think critically about issuing their mathematical ideas by solving problems so that children can provide solutions to problems faced in the play activity itself.

3. Material and Method

This research is based on a problem encountered in the field, namely one of the kindergarten teachers in Maja sub-district who does not know various mathematics content for early childhood, not only problems in the field, this research is also based on similar problems encountered when analyzing several previous studies where it turns out that there are still many teachers who have difficulty packaging mathematics content into play activities, So that to answer all the problems above, the researcher intends to analyze various literature to solve similar problems encountered, so that the results are expected to provide an overview to the next researcher to provide innovations in mathematics teaching and learning practices, especially for early childhood, for that this study aims to provide a study of the results of the literature study on how the role of teachers should be in playing children's mathematics early age, as argued by (Widiarsa, 2019) Cooper in Creswell explains that literature review or bias akita call literature review has the purpose of providing information to readers about the results of previous research or other research that is still related to research conducted by current researchers, by linking literature with designed research and filling in the gaps from previous research. This literature study is one of the techniques of data collection by conducting studies by reviewing various sources ranging from books, journals, previous research, and various other literature related to solving research problems for that researchers must carefully read, analyze, record and process the data needed in writing so that it can be said that the type of writing used by researchers in this study is a literature study Reviews.

The results of the analysis of the literature study will be described in detail with a qualitative descriptive approach, which is the most appropriate approach to be used in this study, as stated by (Roostin et al., 2022) qualitative descriptive is one approach where data obtained by researchers from various sources are collected, analyzed and described thoroughly and in detail. To support this literature review study, researchers used various

library sources ranging from reputable journals, books and other leading data related to teachers and playing early childhood mathematics.

3.1 Data Analysis

Literature from various journals in accordance with research criteria will be collected then a summary is made in the form of a table ranging from name, research title, method used, year published, journal name, research objectives and findings or research results, summary analysis of these various journals will be included in a table. The flow of the literature study that will be carried out in this study can be seen in the picture below.

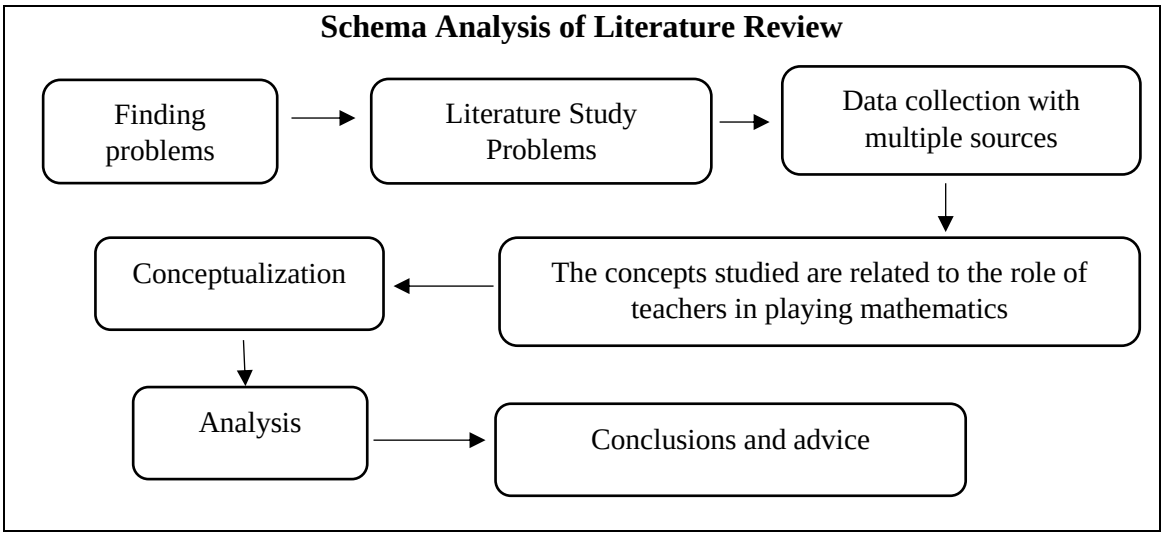

Figure 1. Research Model

4. Result

To give readers an idea of the literature analysis conducted by the researchers, the researchers designed a table of various journal articles that support this study, so that readers can carefully assess the role of teachers in early childhood math play activities.

Table 1. The Role of Teachers in Early Childhood Math Play

1		
Writer: Amy MacDonald & Steve Murphy (MacDonald & Murphy, 2021)	**Heading:** Mathematics education for children under four years of age: a systematic review of the literature	**Journal / Year published :** Early Years An International Research Journal / 2021
Method/sample: Literature review / 103 papers that meet the criteria	**Research objectives:** This paper reports findings from a systematic review of peer-reviewed research on mathematics education for children under four years old	
Masalah/Finding/conlusion:		

The literature in this designed study presents strong evidence. The evidence presented in this review shows that every child has a natural potential in maths and teachers play an important role in highlighting each of these competencies by giving children opportunities for exploration.		
2		
Writer: Vicki Schriever , Susan Simon & Sharn Donnison (Schriever et al., 2020)	**Heading:** Guardians of play: early childhood teachers'perceptions and actions to protect children's play from digital technologies	**Journal / Year :** International Journal of Early Years Education Vol 28 (2020) Issue 4-Q2
Method/sample: Involving 19 Preschool teachers who teach children with an age range of 3.5-4.5 years	**Research objectives:** Provide a better understanding of teachers' perceptions on digital technology, children and childhood and reveal actions taken to manage children's digital experiences in kindergarten	
Masalah/Finding/conlusion : ECCE teachers have a perception of digital technology, where this perception influences the teacher's pedagogical decision making, teachers are confident that they can use digital technology in activities with children but it would be better if the use of digital in schools is limited, although schools are the right place to introduce children to everything, especially digital technology but schools also need to provide certain restrictions, Because there is an important thing that children need is the need for children's free play, where children's involvement in play activities helps all aspects of child development, so that teachers have an understanding that play as something exclusive rather than digital technology itself		
3		
Writer: Maria Papandreou & Maria Tsiouli (Papandreou & Tiouli, 2020)	**Heading:** Noticing and understanding children's everyday mathematics during play in early childhood classrooms	**Journal / Year published :** International Journal of Early Years Education / 2020
Method/sample: Quality - Case Study using ethnographic techniques / Teacher, orangua and 13 kindergarten children (6 P 7 L with an age range of 5.2 years)	**Research objectives:** This study seeks to increase knowledge by investigating various aspects of children's mathematics during free play routines in ECCE classrooms based on socioculutural theory and knowledge frameworks as well as pedagogic play	
Masalah/Finding/conlusion: Play activities become a means for children to understand mathematics, and to express children's knowledge of mathematics, they use mathematical language through simple words and movements, for example When children will show numerical quantities, children count down from 9-1 with enthusiasm which indicates school time is about to end, this simple activity represents a measurement of time. There are sociocultural math play activities such		

as when the child's cake cooking activity will set the oven temperature number at school exactly as his mother usually does at home, with the same dejarat and this also shows that the environment affects early childhood mathematics knowledge		
4		
Writer: Marilyn Fleer (Fleer, 2021)	**Heading:** Conceptual Playworlds: the role of imagination in play and learning	**Journal / Year published :** Early Years An International Research Journal Vol 41 (2021) Issue 4
Method:	**Research objectives:** This study aims to present a critical picture related to how imagination in a game becomes the basis for conceptual learning with a cultural-historical perspective perspective, the relationship between play and learning in preschool, which is illustrated with Charlotte's Web practice in the practice of Conceptual Play Worlds	
Masalah/Finding/conlusion : Charlotte's Web practice program on game-based Conceptual Play Worlds practice can support learning, because conceptual playworlds create a productive pedagogical condition for building dynamic relationships between play and learning. Playworld is designed as a means of playing imagination in helping children's development and clarifying the importance of play for the development of each child		
5		
Writer: Emelie Stavholm, Pernilla Lagerlöf & Cecilia Wallerstedt (Stavholm et al., 2022)	**Heading:** Re-mediation in Early Childhood Teachers' Reasoning about their Role in Play: An Empirical Study of the Learning Process of a Work Team	**Journal / Year published :** Early Years An International Research Journal / 2022
Method: research projects as well as and joint research development / 4 ECCE teachers with children aged 1-3 years in Swedish preschools	**Research objectives:** This research focuses on the professionalism of ECCE teachers in education and parenting in ECCE and responds to contemporary challenges in understanding the role teachers play in	
Masalah/Finding/conlusion : Although children start play, teachers can also add something to make the game more developed, fun and last longer, something that children cannot do alone, this research shows that the role of the teacher in play activities becomes a central focus for developing these play activities to be more developed and the role of teachers in play helps younger children to get direction and guidance that Obviously, even older children need teachers so that the game becomes better so that all children get their own portions.		
6		

Writer:	**Heading:**	**Journal / Year Published :**
Johanna Lundqvist, Karin Franzén & Ann-Charlotte Munter (Lundqvist et al., 2021)	Early childhood mathematics: a case study	Early Years An International Research Journal / 2021
Method/sample: Case study / 3 teachers and 19 children with age range (3-5 years)	**Research objectives:** To investigate how the quality of early childhood mathematics in Swedish preschools	
Masalah/Finding/conlusion : An innovative approach to learning maths at AUD is through play, during maths learning pre-school teachers in Sweden support and encourage children who have difficulties e.g. When there are those who sequence numbers 1-10 andhave difficulty in counting, then only the teacher's play approach guides the child until the child is able to complete it to the stage of presenting the numbers directly. simple and for sorting, comparing and matching activities teachers using simple comparative language techniques to children, until children get math results close to the "good" category, this shows that bermian and mathematical language also affect children's understanding of mathematics		
7		
Writer:	**Heading:**	**Journal / Year published :**
Syaiputra Wahyuda Meisa Diningrat, Luluk Janah, Sakinatul Mardiyah (Diningrat et al., 2019)	Modified Bottle Cap for Improving Children's Arithmetic Ability	Journal of Early Childhood Education (JPUD-UNJ) Volume 13 Issue 2 November 2019
Methods: Quasiexperiment / 60 children aged 4-5 years (kindergarten in Galis)	**Research objectives:** This study aims to determine the effectiveness of bottle cap modification as an educational game tool to improve numeracy skills	
Masalah/Finding/conlusion : Arithmetic assessment that is assessed in this study is addition and subtraction through modification of bottle caps as an educational game tool for playing and counting as an effort to improve children's mathematical skills, The results showed that in the experimental class children's numeracy skills increased significantly compared to children in the control class. The difference may be due to intervention. In conclusion, bottle cap modification as an educational game tool is effective to improve children's math skills, especially for counting skills. The study also shows that from the point of view of teachers' knowledge of mathematics, a teacher who has better knowledge of mathematics leads to better learning practices such as providing and implementing adequate lesson plans and a teacher who has poor knowledge of mathematics causes teaching practices to be worse as well		
8		
Writer:	**Heading:**	**Journal / Year published :**
Ade Dwi Utami, Marilyn Fleer &; Liang Li (Utami et al., 2020)	Shift in teachers' pedagogical practices in	international Journal of Early Years Education Vol 28 Issue 4 / 2020

	play- based programme in Indonesia	
Method: Study Experiment / 8 female teachers, 1 male teacher and 38 Children (18 males, 20 female Teachers)	**Research objectives:** This research focuses on exploring teachers in changing their pedagogical practitioners with formal play models to play approaches combined with cultural-historical theory, so this study seeks to investigate how teachers' pedagogical practitioners play in the Indonesian context	
Masalah/Finding/conlusion : The application of playworld provides a new understanding of how imaginary play practices give children the opportunity to explore themselves and their environment, so that the application of playworld has a good impact on child development, and the role of teachers in the practice of pedagogic models of play in playworld is very important because this pedagogical practice provides insight as well as new images and opens understanding of different game implementations to teachers.		
9		
Writer: Witri Intan Ardi and Rika Devianti (Ardi & Devianti, 2021)	**Heading:** The Role of Teachers in Early Childhood Play Activities	**Journal / Year published :** Mitra Ash-Shibyan: Journal of Education and Counseling / 2021
Method: Qualitative description / 3 teachers As-Salam Kindergarten Pekan Arba Tembilahan	**Research Objectives:** Researchers wanted to observe further the role of ECCE teachers in children's play activities in As-Salam Pekan Arba Tembilahan Kindergarten	
Masalah/Finding/conlusion : The role of the teacher as an educator but in the context of play Together with children teachers have a dual role can be designers or designers, observers, models, facilitators or providers who support play activities, leachators and assessors		
10		
Writer: Khaerun Nisa, Syarifah Halifah (Nisa & Halifah, 2021)	**Heading:** Cultural and Mathematical Intermingling: Konjo Traditional Cake on Early Childhood Introduction to Geometric Shapes	**Journal / Year Published :** Obsession-Journal of Early Childhood Education / 2021
Method/sample: Qualitative Research with Ethnographic Approach	**Research objectives:** describe the concept of geometry in traditional Konjo cakes as well as the process of using traditional Konjo cakes in the introduction of geometry in early childhood	
Masalah/Finding/conlusion : The concept of mathematics can be explored in Indonesian culture. In addition, it further emphasizes that mathematics and culture are related, and can be used as a reference in		

concrete mathematics learning activities. The results showed that there are nine types of traditional Konjo cakes that contain geometric concepts, findings and analysis of these traditional cake forms, so traditional Konjo cakes can be classified in the form of flat wake and space wake geometry		
11		
Writer: Yasemin Corup-Gencturk, Tammy Tolar (Copur-Gencturk & Tolar, 2022)	**Heading:** *Mathematics Teaching Expertise: A Study Of Conten Knowledge, Pedagogical Content Knowledge and content Specific Notocing Skills*	**Journal / Year Published :** Teaching and Teacher Education / 2022
Method/sample: 290 teachers from 48 states in the United States	**Research objectives:** Aims to investigate whether teachers' specific content is a distinct form of their content-specific expertise for mathematics teaching in addition to its content and pedagogical.	
Masalah/Finding/conlusion : Teacher content and pedagogical content knowledge, these are two indicators of expertise in mathematics teaching, play an important role in the quality of mathematics. The strong correlation between content knowledge and pedagogical content knowledge suggests that teachers who have stronger mathematical content knowledge also seem to have stronger pedagogical content knowledge, as well as others		
12		
Writer: Kristin Lyn Whyte, M. Abigail Stein, Debbie Kim, Natalie Jou dan Cynthia E. Coburn (Whyte et al., 2018)	**Heading:** Mathematics in early childhood: Teacher educators' accounts of their work	**Journal / Year Published :** Journal of Early Childhood Teacher Education
Method/sample: Quality (interviews) / 45 ECCE teachers from 17 different states	**Research objectives:** to examine what early childhood educators are saying about their work. It was found that there were only slight differences in how they described: what they taught, how to teach it, the resources they took, and what informed their work in mathematics learning	
Masalah/Finding/conlusion : When it comes to pedagogical practices in mathematics learning, for early childhood most teachers use play and play in introducing math content to children in their own way. Although of all the maths content teachers talk more about numbers and some teachers complain about the lack of time they have dedicated to maths, they continue to improve themselves by learning through different sources		
13		
Writer:	**Heading:**	**Journal / Year published :**

Putri Maulida Hassanah, Badruli Martati, Aristiana, Prihati Rahayu (Hasanah et al., 2021)	Analysis of Factors Causing Initial Numeracy Difficulties in Children Aged 4-5 Years at Aisyiyah Bustanul Athfal 14 Kindergarten Surabaya	PEDAGOGY: Journal of Early Childhood and Early Childhood Education Volume 7 Number 1 February / 2021
Method: descriptive qualitative using observation and interview / group A (15 children) and data source Kindergarten teacher Aisyiyah Bustanul Athfal 14 Surabaya	**Research objectives:** The purpose of this study was to analyze the factors causing the difficulty of early numeracy in children aged 4-5 years	
Masalah/Finding/conlusion: This study shows that there are 2 factors that cause children's difficulty in counting, namely internal factors, this factor arises from children, meaning children with an age range of 4-5 years lack interest in learning mathematics where children prefer play activities, while the second factor is from the teacher himself, where the teacher has not been able to present varied media that interests children to learn mathematics, So that the result is that mathematics learning activities tend to be more teacher-centered, resulting in children lacking interest in learning mathematics and mathematics learning activities in the classroom become disorderly, of course, this will affect the ability to count at the beginning of children		

Based on the results of a study from the 13 journals above, an interconnected relationship was found related to the role of teachers in playing early childhood mathematics. In the introduction, scheme and analysis of the article above, we can see that the main problems that are found both in the field and from previous research refer to teachers' ignorance of mathematics content for early childhood resulting in the practice of learning mathematics with repetitive material, not only that in the literature findings, teachers are also still found unable to create fun and meaningful math play activities for children Early this has an impact on the practice of learning mathematics becomes rigid resulting in children who lack interest in mathematics, this is certainly triggered due to lack of understanding and inability of teachers to package content in a play activity. After analysis and repeated review, the red line was found that (Diningrat et al., 2019) Teacher knowledge of mathematics content becomes the most basic point before being applied to children, in the sense that the role of the teacher is not only to know one or two contents but the teacher must also know various other mathematical content that can be introduced to children, not only that teachers also need to understand the appropriate mathematical content for children based on their developmental stage age by making thorough observations as the initial stage of introducing mathematical content, and (Lundqvist et al., 2021) The use of mathematical language used by teachers also affects children's mathematical understanding and in pedagogic practice teachers as the main model are required to understand and master the concept of play that is appropriate for children and certainly attract interest in mathematics, for that teachers as much as possible understand the concept of pedagogic play one example such as creating innovations from the concept of playing playwords designed by

(Utami et al., 2020) and (Fleer, 2021) Their research examines and provides new insights to ECCE teachers that play can be carried out in a fun and flexible way and teacher involvement in play activities is at the core of the success of a game created. The theory of Vygotsky's concept of play may still sound unfamiliar to teachers in Indonesia so it is not uncommon to find early childhood teachers who still have difficulty in packaging mathematical content into play activities, even though When teachers understand the concept of play from Vygotsky teachers will be able to understand that play as the most important activity that must be done by early childhood because it is closely related to child development, even Vygotsky believed that bermian could encourage children's scientific imagination (Utami, 2023). From several previous research analyses, researchers found a gap where in the practice of playing mathematics there are still many teachers who do not fully understand their role as early childhood educators which requires teachers to be able to plunge into the world of children not children who plunge into the world of adults because the way children think is certainly different from adults (Supriadi, 2018), in the practice of learning mathematics, teachers are expected to make an innovation from all directions, this is done in order to create a natural mathematical play situation because children have a tendency to get bored easily with something that is repetitive and not pariasi if the child has lost interest in learning, the biggest possibility is that the child will have difficulty in understanding mathematics further because of the loss of interest in mathematics (Hasanah et al., 2021), that's why teachers play a big role in the practice of mathematics because it is through teachers that children learn to understand simple concepts to more abstract concepts, (Vogt et al., 2018) Her research shows clearly that innovative approaches in education to introduce children to early maths can only succeed through play, (Stavholm et al., 2022) Although the child starts the game, the teacher also must be involved in the game Because the teacher's role is to provide clear guidance or direction when there are children who have difficulty regarding their role in play, the teacher's involvement in play activities also helps the game to be more developed, with various scientific and mathematical arguments or questions that the teacher can ask so as to train children to think critically in the game. But unfortunately there are still many ECCE teachers in Indonesia do not understand their involvement in play activities or in a children's game, teachers are only limited to planning and supervising even though what children need in games is the involvement of the teacher, When teachers involve themselves in a game then the greatest possibility is that children bring out their ideas and imaginations and communicate them through the questions that the teacher asks, Example: When the teacher is involved in role-playing as a family of rabbits and the teacher plays the role of one of the rabbit children, the teacher can ask the children "I only have 5 pieces of biscuits while we have 10 people, so how can all rabbits eat these biscuits equally?" questions with simple mathematical language like this can be asked when teachers are involved in a children's game.

From the explanation above, we can say that in mathematics play activities, teachers not only become educators who are knowledgeable and understand mathematical content, but in practice teachers also understand the concept of play that is appropriate for children in the sense that teachers also play an important role as planners in the play activities themselves which are outlined directly in RPPH which is adjusted to child development and implemented Together with children with the initial stages of designing Game activities that will be carried out

together, the teacher also acts as an observer, where the teacher observes every characteristic of the child or When the child has difficulty accepting his friend or difficulty in joining a playgroup, the teacher becomes a bridge to the gap or problems found, the teacher as a facilitator is where When children do play activities, the teacher must prepare everything needed to support children's activities such as preparing media and setting up the play area, the teacher also acts as a model where in this case the teacher is directly involved in a game, the teacher as an elaborator this role is needed by children where When children have difficulty understanding something in play activities then the teacher can explain things he does not understand small examples when children do not understand their role in the game then the teacher can explain, Provide illustrations or even exemplify things that children must do, in mathematics play activities the teacher also acts as an evaluator where the teacher plays a role in analyzing and assessing the play process carried out also analyzing things related to children's interests and development during the play process, this is needed so that in the future teachers can design better play activities and see what kind of play activities are appropriate for children with its various characteristics.

5. Discussion

This study found that the teacher's knowledge and understanding related to mathematical content became the foundation of children's understanding related to the next mathematics, meaning that when the teacher does not understand concept A thoroughly, it will have an impact on children's understanding so that children will find it difficult to understand concept A as a whole so it is difficult to continue at stage B, this is because mathematics is a science that is structured and systematic (Supriadi, 2018) This is also in line with (Dooley et al., 2014; Moll, 1990) The role of the teacher is not just to educate but the teacher's knowledge on the content determines the understanding and development of students later, For this reason, in pedagogic practice, teachers have a role to recognize and understand in advance various mathematical content and all standards that support their practice. In pedagogic practice, especially for early childhood, teachers are also required to be able to open insights into pedagogic play, (Utami, 2023) The teacher is a player working with children to build unique interactions to encourage children to be motivated to develop their understanding with various concepts related to math content. Even though we all know that from 2014 the Indonesian government has issued a policy and has made play activities mandatory in every learning practice in early childhood, but in fact this policy is understood and implicated in various ways where Piaget's theory in the scope of Indonesian Education has become thicker or more dominant in the practice of early childhood education so that it is not uncommon to find education for early childhood in Indonesia even more Oriented to children's academic outcomes, this produces quite complex impacts as a result of which children's needs for play and aspects of development become neglected. The gap between play practices in western countries and in Indonesia is very different, Indonesian teachers know that play is very important to be present in teaching and learning activities, but in practice teachers are still unable to develop these activities in a more natural and flexible direction, teachers are still bound by various rules and administrative arrangements, making it difficult for children to explore the mathematical environment, this certainly impacts children's limited math

experience, but it is different when the teacher gives inotivation as done (Diningrat et al., 2019) which provides innovation to media designed to help improve children's numeracy skills and it turns out that simple innovations are very effective in improving children's numeracy skills, what previous researchers did gives us a small picture that no matter how small innovation is done by a teacher, the impact will be very large on children, as well as teacher understanding when teachers understand playing mathematics is an activity that only includes numbers And counting alone then the child's experience and understanding of mathematics children are also only limited to that, that is why teachers need to improve their knowledge and understanding of mathematical content and the implications of the content through fun mathematical play activities, and to create fun mathematical activities teachers need to be encouraged to continue learning to understand the concepts of pedagogic play.

6. Conclusion, Implication, and Recommendation

Based on the results of literature analysis from several previous studies related to the role of teachers in playing early childhood mathematics shows that deep teacher understanding of content plays a role and has a major impact on children's understanding of mathematics further, it can be concluded that the application of mathematics content for early childhood must be packaged into play activities that are flexible and accompanied by teacher knowledge and mastery of mathematics content and direct involvement of teachers in mathematics playing activities, so it can be said that the role of teachers in playing mathematics is not only Compiling games but the role of teachers in playing mathematics, namely teachers acting as planners and designing appropriate activities for children, in mathematics play activities teachers also play a role in providing all the things needed to support mathematics play activities or we call facilitators, In play activities the teacher also acts as a model, and when in play activities there are children who experience obstacles, the teacher plays a role as an elaboraor guiding children to understand their role in the game, and the teacher as an assessor or evaluator in this case the teacher also analyzes and assesses the process of play activities and child development and last but not least also the teacher as much as possible trains their mathematical language because of the use of mathematical language given To children it also affects children's understanding of mathematics. Despite the fact that there are still many teachers who do not fully understand their role in playing mathematics, researchers have great hopes that later there will be further researchers who can provide innovations in boosting teachers' deeper understanding related to playing mathematics, Indonesian ECCE teachers must recognize that mathematics content is not interrupted only on numbers and counting but there are also other content that can be introduced to children, Teachers must also understand that their involvement in play is very much needed by children not only limited to planning but children also need the role of teachers in these play activities but to build that understanding ECCE teachers need a training devoted to the introduction of mathematics and play content, researchers hope this research can be used as a source of data that will help research for future researchers.

7. Acknowledge

In designing this study, researchers had difficulty in finding literature that supports the writing of this paper.

8. References

Ardi, W. I., & Devianti, R. (2021). The Role of Teachers in Early Childhood Play Activities. *Mitra Ash-Shibyan: Journal of Education and Counseling*, *4*(02), 125–134. https://doi.org/10.46963/mash.v4i02.344

Astuti, F. P., Sulistyaningtyas, R. E., Fardani, F. F. Y., Ariana, M., &; Nugraheni, C. (2021). Analysis of the Implementation of Algebra Learning in Children Aged 5-6 Years. *Journal of Obsession : Journal of Early Childhood Education*, *6*(3), 1277–1285. https://doi.org/10.31004/obsesi.v6i3.1682

Bedilius Gunur; Alberta Parinters Makur; Apollonia Hendrice Ramda. (2018). The Relationship between Numerical Ability and Mathematical Problem Solving Ability of Students in Rural Areas. *MaPan : Journal of Mathematics and Learning*, *6*(2), 148–160. https://doi.org/https://doi.org/10.24252/mapan.2018v6n2a2

Charlesworth Rosalind. (2011). *Experiences in Math for Young Children* (Linda Schreiber-Ganster (Ed.); sixth edit). Wadsworth.

Clements, D. H., & Sarama, J. (2020). Learning and Teaching Early Math. *Learning and Teaching Early Math*. https://doi.org/10.4324/9781003083528

Copur-Gencturk, Y., & Tolar, T. (2022). Mathematics teaching expertise: A study of the dimensionality of content knowledge, pedagogical content knowledge, and content-specific noticing skills. *Teaching and Teacher Education*, *114*, 103696. https://doi.org/10.1016/j.tate.2022.103696

Daniels, H. (2016). Vygotsky and Pedagogy. In *Vygotsky and Pedagogy*. https://doi.org/10.4324/9781315617602

Delfia, E., & Mayar, F. (2019). Instilling the Concept of Child Numeracy through Fruit Piece Matching Games. *Journal of Obsession : Journal of Early Childhood Education*, *4*(1), 350. https://doi.org/10.31004/obsesi.v4i1.350

DoDEA College and Career Ready Standards for Mathematics CCRSM Grade Kindergarten. (2015). *August*.

Dooley, T., Dunphy, E., & Shiel, G. (2014). *Mathematics in Early Childhood and Primary Education (3-8 years): Teaching and learning*. *18*, 164. http://www.ncca.ie/en/Publications/Reports/NCCA_Research_Report_18.pdf

Education, M. D. of, & Services, M. D. of H. & H. (2015). *Maine's Early Learning and Development Standards*. *March*.

Figueiredo, M. P., Gomes, H., & Rodrigues, C. (2018). Mathematical pedagogical content knowledge in Early Childhood Education: tales from the 'great unknown' in teacher education in Portugal. *European Early Childhood Education Research Journal*, *26*(4), 535–546. https://doi.org/10.1080/1350293X.2018.1487164

Fleer, M. (2015). Pedagogical positioning in play – teachers being inside and outside of

children's imaginary play. *Early Child Development and Care*, *185*(11–12), 1801–1814. https://doi.org/10.1080/03004430.2015.1028393

Fleer, M. (2021). Conceptual Playworlds: the role of imagination in play and learning. *Early Years*, *41*(4), 353–364. https://doi.org/10.1080/09575146.2018.1549024

Hapidin, yuli pujianti; wahyuni nadar; sri indah; eti s. ; (2014). *Kindergarten/ECCE Education Management* (1st Edition). Open University.

Hasanah, P. M., Martati, B., & Rahayu, A. P. (2021). Analysis of Factors Causing Initial Numeracy Difficulties in Children Aged 4-5 Years at TK Aisyiyah Bustanul Athfal 14 Surabaya. *Pedagogy : Journal of Early Childhood and Early Childhood Education*, *7*(1), 116. https://doi.org/10.30651/pedagogi.v7i1.6999

Huda, K. (2019). Improvement of social skills through plasticine play. *Visionary Journal : Research and Development in the Field of Educational Administration*, *4*(1). https://doi.org/10.33394/vis.v4i1.1978

Kennedy, L. M., & Johnson, A. (2007). *Guiding Children ' s Learning of Mathematics, Eleventh Edition* (11th ed.). Thomson Wodsworth.

Li, G. (2006). Culturally Contested Pedagogy. In *Albany*. http://10.0.12.66/cmlr.63.4.575%0Ahttp://proxy.libraries.smu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eue&AN=507984688&site=ehost-live&scope=site

Lundqvist, J., Franzén, K., & Munter, A. C. (2021). Early childhood mathematics: a case study. *Early Years*, *00*(00), 1–15. https://doi.org/10.1080/09575146.2021.2014404

MacDonald, A., & Murphy, S. (2021). Mathematics education for children under four years of age: a systematic review of the literature. *Early Years*, *41*(5), 522–539. https://doi.org/10.1080/09575146.2019.1624507

Michigan State Board of Education. (2005). *Early Childhood Standards of Quality for Prekindergarten*.

Missouri Early Learning Standards for Social and Emotional Development and Approaches to Learning (pp. 1–17). (n.d.).

Mursid. (2015). *ECCE Learning Development* (1st ed.). PT Remaja Rosdakarya.

NCTM. (2006). Curriculum Focal Points for Pre-K-Grade 8 Mathematics. *Teaching Children Mathematics*, *13*(3), 159. http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=23869416&lang=es&site=ehost-live

Nisa, K., & Halifah, S. (2021). Cultural and Mathematical Intermingling: Konjo Traditional Cake on Early Childhood Introduction to Geometric Shapes. *Journal of Obsession : Journal of Early Childhood Education*, *6*(1), 445–456. https://doi.org/10.31004/obsesi.v6i1.936

Nurani, Y. (2022). *Creative Play Curriculum Based on Multiple Intelligences*. AIMMA-K PAUD.

Papandreou, M., & Tsiouli, M. (2020). Noticing and understanding children's everyday mathematics during play in early childhood classrooms. *International Journal of Early*

Years Education, *0*(0), 1–18. https://doi.org/10.1080/09669760.2020.1742673

Pensylvania State Department of Education, & Pensylvania State Department of Human Services. (2014). *Pennsylvania Learning Standards for Early Childhood Pre-Kindergarten*.

Putri, A. A., & Suparno. (2020). Recognize Geometry Shapes through Computer Learning in Early Math Skills. *JPUD - Jurnal Pendidikan Usia Dini*, *14*(1), 43–57. https://doi.org/10.21009/jpud.141.04

Ratna Dewi, N. W. U., Asril, N. M., &; Wirabrata, D. G. F. (2021). Improving Early Numeracy Skills in Early Childhood Through Animated Videos. *Journal of Early Childhood Education Undiksha*, *9*(1), 99. https://doi.org/10.23887/paud.v9i2.36800

Republic of Indonesia, P. (2005). *Law 14-2005 on Teachers and Dosen.pdf* (p. 17).

Rohmalina, R., Aprianti, E., &; Lestari, R. H. (2020). Open-Ended Approach in Influencing the Ability to Recognize Early Childhood Number Concepts. *Journal of Obsession : Journal of Early Childhood Education*, *5*(2), 1409–1418. https://doi.org/10.31004/obsesi.v5i2.805

Sari, N. M., Yetti, E., & Hapidin, H. (2020). Development of Mipon's Daily Game Media to Improve Children's Numeracy Skills. *Journal of Obsession : Journal of Early Childhood Education*, *4*(2), 831. https://doi.org/10.31004/obsesi.v4i2.428

Schriever, V., Simon, S., & Donnison, S. (2020). Guardians of play: early childhood teachers' perceptions and actions to protect children's play from digital technologies. *International Journal of Early Years Education*, *28*(4), 351–365. https://doi.org/10.1080/09669760.2020.1850431

Stavholm, E., Lagerlöf, P., & Wallerstedt, C. (2022). Re-mediation in Early Childhood Teachers' Reasoning about their Role in Play: An Empirical Study of the Learning Process of a Work Team. *Early Years*, *00*(00), 1–15. https://doi.org/10.1080/09575146.2022.2131741

Supriadi. (2018). *How to Teach Mathematics for PGSD* (A. Arisetyawan (ed.)). PGSD UPI Serang Campus.

Syaiputra Wahyuda Meisa Diningrat, Janah, L., & Mardiyah, S. (2019). Modified Bottle Cap for Improving Children's Arithmetic Ability. *JPUD - Jurnal Pendidikan Usia Dini*, *13*(2), 249–263. https://doi.org/10.21009/jpud.132.04

Tedjasaputra, M. S. (2001). *Play, toys and games - Google Books*. Grasindo. https://books.google.co.id/books?id=6rk4jujVmFsC&printsec=frontcover&hl=id#v=onepage&q&f=false

The National Council of Teachers of Mathematics. (2000). Principles Standards and for School Mathematics. In *วารสารวิชาการมหาวิทยาลัยอีสเทิร์นเอเชีย* (Vol. 4, Issue 1). www.nctm.org

Utami, A. D. (2023). *Pedagogic Play Understanding Theory and Practice* (First). Prenada Media Group.

Utami, A. D., Fleer, M., & Li, L. (2020). Shift in teachers' pedagogical practices in play-based programme in Indonesia. *International Journal of Early Years Education*, *28*(4), 397–412. https://doi.org/10.1080/09669760.2020.1777846

Vogt, F., Hauser, B., Stebler, R., Rechsteiner, K., & Urech, C. (2018). Learning through play–pedagogy and learning outcomes in early childhood mathematics. *European Early Childhood Education Research Journal*, *26*(4), 589–603. https://doi.org/10.1080/1350293X.2018.1487160

Whyte, K. L., Stein, M. A., Kim, D., Jou, N., & Coburn, C. E. (2018). Mathematics in early childhood: Teacher educators' accounts of their work. *Journal of Early Childhood Teacher Education*, *39*(3), 213–231. https://doi.org/10.1080/10901027.2017.1388306

Widiarsa. (2019). Literature review as an intimate service for Librarians based on the expertise and interests of Users. *Information Media*, *28*(1), 111–124. https://doi.org/10.22146/mi.v28i1.3940