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Submission date: 18-Oct-2019 08:24PM (UTC-0700)

Submission ID: 1195883118

File name: PROSIDING_STITNU_FIX_2019.pdf (1.15M)

Word count: 4357

Character count: 22092

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Abstract: *Cognitive is one aspect of the ability that must be developed from an early age, because throughout life will not be separated from the cognitive abilities of mathematical concepts and science that will continue to grow. Early childhood cognitive learning should be tailored to the nature and stages of early childhood development, playing while learning and packed with interesting and fun methods. Learning Approach Model is a design that describes the process in detail and the creation of environmental situations that allow children to interact in learning so that there is a change or development in children. Sentra is a model of a learning approach centered on the centers of activities and when children are in a circle with the teacher can create a learning activity that allows the child to move from one learning activity to another. In pemajarn center of teachers more emphasis on applying the concept of learning while doing something learning by doing. The use of this learning approach model will provide direct experience to the child because the child's cognitive ability level is in the concrete pre-operational phase.*

Keywords: *Cognitive, center, early childhood.*

PRELIMINARY

Early childhood is a group of children aged between 0-8 years who have various genetic potential and are ready to be grown by giving various stimuli, Sujiono (2009). Furthermore, at this early age is also called the golden age, which is a sensitive period and only come once so demanding optimal child development, Depdiknas (2007).

According to Permendikbu⁴ Number 146 of 2014 explaining the establishment of Early Childhood Education Unit, Early Childhood Education (PAUD) is a coaching effort aimed at children from birth up to the age of 6 (six) years conducted through the provision of educational stimuli to assist growth and development physically and spiritually so that children have readiness in entering further education. Early childhood education¹¹ in its learning activities develop several aspects of child development that include aspects of religious and moral values, physical motor, cognitive, language, social-emotional, and art. One of the most important aspects of early childhood development is cognitive abilities that include simple mathematical and science concepts for early childhood. Cognitive ability is a broad understanding of thinking and observing, so it is the behaviors that result in people acquiring the knowledge or knowledge needed to use knowledge, Mustofa (2016). Cognitive development includes mathematics (early numeracy) and simple science.

In general, the development of cognitive abilities of mathematics in kindergarten aims for children to know the basics of numeracy learning so that children are mentally ready to follow the learning of mathematics in the next level in elementary school. In the beginning, Piaget (in Mustofa 2016) says that the child is at a stage of concept or understanding of something by using concrete objects and events. Understanding or understanding at this stage obtained by exploring the child with calculating all kinds of



objects that can be calculated. Meanwhile, cognitive learning science should be in accordance with the characteristics and stages of children's perkeng¹⁰. Strong education can have a dramatic effect on the lives and welfare of children. The National Association for the Education of Young Children-NAEYC Guidelines for Developmental Appropriate Practice-DAP Bredekamp and Coppie, 1997 (Aisyah, 2007) states, among others; (1) preschoolers should be actively involved, (2) playing spontaneously on their own or with friends is a natural and valuable way, (3) children have knowledge, concepts, and experiences different. It is important that learning should be related to what the child already knows and is relevant to them. So in the development of cognitive abilities⁶ of mathematics and science, the activities should be packaged in the form of games in accordance with the nature of early childhood that is playing while learning and the child gained direct experience of the activity which is done so that learning will be more meaningful for the child. Many models and learning approaches are applied in learning activities, but often teachers forget the nature of early childhood education, and still use an approach where teacher-centered learning. One of the models of a¹⁸ learning approach and able to provide direct experience to children is through a model of learning approaches BCCT (Beyond Center and Circle Time) which is often called Sentra. Sentra is a model of child-centered learning approach, children are given the opportunity to explore their abilities, stimulate children to be active, creative, and continue to think by digging their own experiences. The relationship between the model of learning approach with the efforts of developing cognitive abilities of others where in the learning approach model of learning sentra children to explore their own experiences then the child is able to develop the initial concept that has been owned by the child naturally then indirectly will be associated with what the experience he gained.

DISCUSSION

1. Cognitive Ability of Early Childhood

Cognitive is a process of thinking, namely the ability of individuals to connect, assess and consider an event or event. Cognitive processes related to the level of intelligence or (intelligence) that marks a person with a variety of interests, especially aimed at ideas and learning (Susanto, 2011). While that is meant intellect is think⁷g, while the meaning of intelligence is intelligence, Minet (in Sujiono, 2007). Cognitive development describes how the child's mind develops and functions so that it can think. Meanwhile, according to Piaget (in Sujiono, 2007) states that "cognitive is how children adapt⁹ and interpret objects and events around it". Piaget considers that the child plays an active role in constructing knowledge about reality, the child is not passively receiving information. Furthermore, although the process of thinking and conception of the child about reality has been modified by his experience with the environment around the child, in this case the teacher or parents actively provide information and stimulation, but the child is also actively able mengintrepretasikan information he has gained from experience, and in



mengadaptasikannya on knowledge and conception. Cognitive theories are based on the assumption that cognitive ability is fundamental and that guides the behavior of children. With this cognitive ability the child is seen as an individual who actively builds their own knowledge of the world.

Cognitive abilities are divided into several cognitive mathematics, namely simple numerical and cognitive science. Calculating the beginnings according to Susanto (2011) is the ability of each child to develop his abilities, the characteristics of his development starting from the environment closest to himself, in line with the development of the ability of the child can increase to the stage of understanding of the number, associated with the addition and subtraction.

Another opinion from Sriningsih (2008) that the activities of counting for early childhood is also called as an activity to mention the sequence of numbers or to blind. The child mentions a sequence of numbers without connecting with concrete objects. At the age of 4 they can name the order of numbers up to ten. While the age of 5 to 6 years can mention numbers up to twenty. Cognitive development describes how the child's mind develops and functions so that it can think. According to Piaget, all child have the same cognitive developmental pattern that is through four stages: (1) sensory-motor 0-2 Year (2) pre-operational, 3-4 Years (3) concrete-operational 5-6 Years, and (4) formal-operational 7-16 Years (Suyanto, 2005). Because the Early Childhood Education of children is in the pre-operational phase of concrete so that teachers are expected to facilitate children with activities or media that are concrete in accordance with the characteristics and stages / phases of its development.

The National Association for the Education of Young Children-NAEYC Guidelines for Developmental Appropriate Practice-DAP Bredekamp and Copple, 1997 (in Aisyah, 2017) states, among others; (1) preschoolers should be actively involved, (2) playing spontaneously on their own or with friends is a natural and valuable way, (3) children have knowledge, concepts, and experiences different. It becomes important that learning should be related to what the child already knows and is relevant to them. Listening to the above statement and taking into consideration the characteristics of the child who, since the womb is ready to learn and be born as a natural researcher who has a strong impetus to conduct exploration and investigation, the implications for adults, especially teachers, should act as facilitators for each child in supporting their interests their curiosity. Providing opportunities, challenges and engaging children in diverse activities to gain the widest direct experience is at the heart of the science process.

2. The Importance of Cognitive Ability Introduction to Mathematics and Science Concepts in Early Childhood

The importance of the introduction of mathematical concepts taught and learned of children from an early age as revealed below. Development of mathematical competence has begun when the child is born. Children from various socioeconomic



and cultural contexts are reached in the world of mathematics since they were born into the world (Anthony & Walshaw, 2009). It is important to lay the foundations of the concept of numbers and operations in mathematics education provided at preschool so that children can understand numerical relationships in subsequent years. To support the development of children in the concept of operations, various studies that will support the development of the concept of numbers should be established, appropriate methods and techniques should be employed, exploration and problem-solving opportunities should be presented by supporting children to learn by Preparing new knowledge and skills over knowledge and the inherent skills they get from first tactile experience (Johansson, 2005).

Mathematical variables according to Runtukahu (in Runtukahu, 1996) that in every nation culture there are six general mathematical activities: 1) Counting, 2) Locating, 3) Measuring, 4) Designing, 5) Playing, and 6) Runtukahu & Kandou, 2014). According to Piaget (in Suyanto, 2005) states that: "The purpose of early mathematics learning as logico-mathematical learning or to learn logical and mathematical thinking in a fun and uncomplicated way. So the goal is not so that children can count to a hundred or a thousand, but understand the language of mathematics and its use for thinking. "While the purpose of science cognitive development by Nugraha (2005) for early childhood, among others: 1) Helps children's understanding of the concept of science and its relationship with everyday life; 2) Helps to attach to aspects of the process of science, so that knowledge and ideas about the natural environment within the child grow; 3) Helps foster an interest in children to know and learn objects and events outside their environment; 4) Facilitate and develop an attitude of curiosity, diligence, openness, critical, introspective, responsible, cooperative and independent in life; 5) Helping children to be able to apply various concepts of science to explain natural phenomena and solve problems in everyday life; 6) Helping children to be able to use simple technology that can be used to solve problems found in everyday life; 7) Helping children to know and cultivate a sense of love for the natural surroundings, so as to realize the greatness and majesty of God Almighty.

3. Level of Achievement of Cognitive Development of Children aged 5-6 Years

Based on Permendiknas Number 137 Year 2014 on National Standards of Early Childhood Education, Level of Achievement of Cognitive Development is in the concept of mathematics and science 5-6 Year Children are as follows:

Table. 1 Level Achievement Child Development Cognitive 5-6 Years

| Scope of Progress | Level of Child Development Achievement | |
|---------------------------------|--|--|
| | Age 5-6 years | |
| IV. Cognition | 1. | Demonstrate exploratory and probing activities (such as: what happens when water is spilled) |
| A. Learning and Problem Solving | 2. | Solve simple problems in everyday life in a flexible and socially acceptable way |
| | 3. | Implementing Knowledge or Experience in a new context |



| | |
|----------------------|---|
| | 4. Demonstrate creative attitude in solving problems (ideas, ideas out of the ordinary) |
| B. Logical Thinking | <ol style="list-style-type: none"> 1. Know the Difference by Size: "more than"; "less than"; and "most". 2. Shows initiative in choosing game themes (such as: "let's play pretend like a rabbit") 3. Prepare planning activities to be performed 4. Know the cause and effect of the environment (the wind blows causing the leaves to move waves, the water can cause something to get wet) 5. lassify objects by color, shape and size (3 series) 6. Classify more objects into the same group or similar groups, or groups in pairs of more than 2 variations 7. Know ABCD-ABCD pattern 8. Sort objects by size from smallest to largest and vice versa |
| C. Symbolic Thinking | <ol style="list-style-type: none"> 1. Mentioning the number of 1-10 2. Use the number symbol to calculate 3. Matching numbers with number symbols 4. Know the various vowels and consonants 5. Represents various objects in the form of drawings or writing (there is a pencil object followed by writing and pencil drawing) |

Source: Permendiknas No. 137 Year 2014

4. Model Learning Approach Sentra

The Directorate of Early Childhood Education (PAUD) in 2005 in the framework of overcoming the weakness of early childhood education has adopted the method of learning using a new approach. The approach is called the center and circle approach (Seling method) adopted from the Creative Center for Childhood Research and Training (CCCRT) based in Florida, USA Union. The approach taken by CCCRT is known as BCCT (Beyond Center and Circle Time). the model of learning approaches such as the center is more to the methods undertaken by the Teachers to their students where the position of Teachers only as a facilitator and motivator, because the most many activities in the game is students, meaning that teacher should be able to provide space and learning activities in the form of diverse to develop 6 aspects of the development of students (Cognitive, Language, Physical Motoric, Social Emotional, Values of Religion and Moral, Art). And before doing the activity then the teacher first need to make a Circle time or circle (Beyond Center).

There are three functions in the BCCT approach: (1) boosting children's intelligence; (2) planting the basic values; (3) basic capability development (Directorate of PAUD, 2006, Arifin, 2009). In the center and circle learning approach model is a method used to train children's development using play approach (Depdiknas, 2005) which is often referred to as playing with learn or learning through play (Arifin, 2009). Three types of games are playing sensorimotor (functional), play a role, and play the development. While in the process of learning



centers and circles of children through four types of foothold (scaffolding) to support child development are: (1) main environmental footing; (2) step before play; (3) footing during play; (4) footing after playing (Phelps, 2005; Directorate of PAUD, 2006; Arifin, 2009). BCCT approach has advantages that are: (1) children will learn better if environment is created natural (naturalistic environment); (2) learning will be more meaningful (learning with meaning) if the child does what is learned not only know (learning by doing); (3) learning will be more meaningful and hit (Depdiknas, 2005, Arifin, 2009).

The philosophy used in the learning method of BCCT (centers and circles) is constructivism, that is, learning is not only about educators and memorization of learning materials, but rather that learners must construct knowledge in themselves (Phelps, 2005).

a) Characteristics of Learning Sentra Model

Learning center model is a learning model that has characteristics that are not owned by other learning. The characteristics can be seen from several aspects, as follows:

1) Class room

Classrooms can be modified into small classes, called vak rooms or centers. Each room vak or sentra consists of one field of development. There are language sentra, preparation sentra, creative sentra, religious sentra (imtaq), art sentra, sentra of motor skills. By using the main activity that includes three types of play (sensorimotor, role and development). Adequate ratio, ideal group size (maximum 10 children), large enough space (5-7 square meters per child).

2) Teacher

Every teacher must love and master the field of development each. Teachers should give general explanations to children who visit the center according to the theme they are studying, directing, watching and watching children when using the tools according to the material they are studying, then asking questions about the difficulties experienced by the students in working on the material. In addition, the center teacher must master the development of each child in doing various tasks so as to follow the tempo and rhythm of every child's development in mastering the materials of teaching or development task. In this center learning, one teacher center is only responsible for 7 to 12 children with moving class every day from one center to another.

3) Play

Making a "play" activity as a core activity, children learn through their game.



4) Foothold

There are footholds that take the children forward or ride themselves to the next stage of development. There is a "circle times" (when the circle)

5) Intensity and density

Intensity is the amount of time it takes for a child to experience three kinds of play throughout the day and throughout the year. While density is a variety of ways each type of play is provided to support a child's experience.

6) Materials and Duties

Each center's teaching materials consist of minimal materials and additional materials. Minimal materials are teaching materials that contain the development of the minimum capability that must be mastered according to the age setiapanak. This material should be controlled by the child and is a target of minimal ability in studying each particular center.

7) Child and Its Duties

Each child will get the task and clarification in class. Each child can choose the sentra that will follow. He is free to determine the time and tools to complete the task. Every child should not do other tasks before the task is done. To develop sociotility, children may work on a particular task together. In this way, the child will have the opportunity to socialize, cooperate, help one another.

8) Evaluation of Child Development Progress

Recording of child's learning activities carried out each meeting by way of noting the development of children's abilities in the motorcycle rough, smooth, language, social and other aspects. Location of children's play activities conducted by teachers (educators). In addition to record the child's learning progress, teachers can also use sheets check list of child development, seen from the work of the children, therefore, all the work of children is used as material evaluation and progress reports of learning of children to their respective parents.

b) Sentra as the Early Childhood Cognitive Learning Approach Model

The Science Sentra has the purpose of providing children with experience to explore with various materials. In this sentra, the observations were carried out in the group B children aged 5-6 years PAUD Lab School UN PGRI Kediri. In this activity the child is invited to play while learning to demonstrate the ability to show, recognize, compare, connect and differentiate. By exploring and experimenting the child will have ideas and sensitivity to the knowledge and the natural surroundings so as to grow motivation and confidence in learning (Arifin: 2009). Activities at the center of the science of children learning with the nearest environment, the nature with the creatures that are around, the child is invited to



be directly involved to explore the experience or knowledge itself through the activities that exist in the sentra of science (plants, vegetables, know the fish, and know the types of plants) then for the math cognitive beginnings of children are invited to count the number of fish and flowers. Then the child learns to develop the original concept of understanding that is then connected with the experience just gained (Learning by doing) the teacher acts as a facilitator in the learning. Not separated by the nature of early childhood education is playing while learning, learning approach model on the center of this science children get meaningful and enjoyable learning can be obtained students and learning objectives can be achieved.



Figure 1 Activity Sentra of Science

CONCLUSIONS AND RECOMMENDATIONS

Cognitive abilities of math (numeracy) and simple science can start from an early age. It is important to lay the foundations of the concept of numbers and operations in mathematics education provided at preschool so that children can understand numeric relationships in subsequent years. To support the development of children in the concept of operations, various studies that will support the development of the concept of numbers should be established, appropriate methods and techniques should be employed, exploration and problem-solving opportunities should be presented by supporting children to learn by Preparing new knowledge and skills over knowledge and the inherent skills they gain from first tactile experience. Then the child learns to develop the concept of early understanding that is then connected with the experience of being just gained (Learning by doing), the teacher acts as a facilitator in the learning. Not separated by the nature of early childhood education is playing while learning, learning approach model on the center of this science children get meaningful and enjoyable learning can be obtained students and learning objectives can be achieved.

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