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IMPLEMENTING SCIENCE AND MATH LEARNING TO BUILD EARLY CHILDHOOD LEARNING INDEPENDENCE

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Abstract

The independent curriculum was initiated as part of the solution to improve teaching and learning in Indonesia. This independent curriculum is closely related to the concept of independent learning which provides flexibility in learning for students. Science and math learning is important to be applied through fun games so that children are always happy and not constrained in learning at school according to the age of the learners playing while learning. This research uses a descriptive qualitative method with case studies used to collect data. The results of the findings in the field show that there are three findings, namely the first Science and Mathematics learning is simpler and more in-depth designed in a fun way and method, the second is more independent The concept that is carried out with science and mathematics learning provides space and time for students to explore their knowledge abilities, and the third is more relevant and interactive to strengthen meaningful play activities as a learning process. The application of Science and Mathematics Learning can be done by conducting assessments with anecdotal notes and work results.

Keyword: Science, Early Childhood Math, Free Learning

INTRODUCTION

The essence of learning activities with this independent curriculum concept is “freedom to learn, freedom to play”. This means that the chosen form of activity should be able to provide a fun and meaningful experience for children (Shalehah, 2023). In this concept, learners have the freedom to organize the course of learning according to their own interests, talents, and goals. Children are given the freedom to choose subjects, learning methods, and learning resources that suit their needs and interests (Andari & Wiguna, 2023). Early childhood education is a fundamental education for children and affects the development of further education, so it is necessary to introduce 21st century learning, namely STEAM from an early age which will build children's positive attitudes about STEAM because children's further growth and development are strongly influenced by what is given to children in the early days (Qotrun Nada et al., 2023). (Science,

Technology, Engineering, Art, and Mathematics) for early childhood can be done by creating a safe and fun learning environment. Providing opportunities for children to explore, discover, build, experiment, predict, look for temporary answers and link knowledge to real life (Novitasari., 2022). Science and math in early childhood are interpreted as developing aspects of early childhood development to build learning freedom. Both play activities must start from simple things in the environment around the child and be carried out through fun games (Shalehah, 2023). The process of running and achieving a curriculum, the teacher plays an important and central role in making the curriculum run well. Educators are required to have the ability to carry out and succeed the teaching and learning process with the curriculum that applies in schools (Anwar, 2021). The concept of an independent curriculum is to provide a broad concept of learning for children to learn in a fun way according to predetermined achievements (Ningtyas et al., 2024). The independent curriculum goes hand in hand with the concept of independent learning launched by the Minister of Education and Culture. In developing an independent curriculum, what needs to be considered is the basic framework and structure of the curriculum. (Eka Retnaningsih & Patilima, 2022).

Early childhood teachers' perceptions of the meaning of the Independent Curriculum, namely 1) the Independent Curriculum is able to develop children's interests and talents which are beneficial for teachers (giving freedom and making it easier) and students (adapting to the surrounding environment); 2) The Merdeka Curriculum has teaching tools that can reduce the burden and realize maximum learning so that the teacher's role as a module designer and facilitator in providing learning runs optimally to develop children's potential (Jannah & Rasyid, 2023). Children will enjoy learning in PAUD because the independent curriculum does not need to use a memorization and calistung system which is actually very incompatible with the PAUD unit education system because in essence the world of children is a world of play. The meaning of independent learning also means making students independent to learn more meaningfully. Because independence is one of the main goals in education. However, the challenge of fostering independence in students takes a long time. (Nisna Nursarofah, 2022). Independent learning in PAUD can also be called independent play. If we associate the idea of learning with early childhood, namely playing while learning, then the concept of independent play is very suitable for early childhood education. Children will enjoy learning in PAUD. The application of science and mathematics learning with independent learning in Sayang Bunda Kindergarten, South Lampung in classroom learning activities carried out by children on Monday 23 October 2023, it can be seen that children recognize and use pre-mathematics concepts to solve problems in their game activities, show basic abilities to think critically, creatively, and collaboratively and show curiosity through observation, exploration, and experimental activities using the surrounding environment and media as learning resources, this is realized by most teachers in terms of renewal in the world of education and Human Resources (HR), Over time both teachers and students will begin to enjoy learning science and mathematics to build independent learning. (Observation October 23, 2023)

From several previous studies, Merdeka Belajar is a breakthrough made by the minister of education, namely Nadiem Makariem, which aims to improve the quality of education (Sumarseh & Eliza, 2022). All changes in the independent learning curriculum support the early childhood growth and development phase. Brofenbrenner reinforces the

changing position of the family as a partner and the use of technology to ensure children's education in accordance with their times (Fitriani et al., 2023). The curriculum in teaching materials is a very important tool for the success of an education. The role of curriculum developers is very important for the world of education for the achievement of better learning processes and outcomes (Ashfarina, 2023). Discussions with children during the learning process about science thinking concepts related to mathematics, existence, literacy, engineering, science, arts and technology are fused with the strengthening of coaching by teachers to children during the learning process (Susetyo et al., 2021).

The Science, Technology, Engineering, Arts, And Mathematics (STEAM) Learning Model is a suitable learning model for developing 21st century skills for early childhood. (Sit & Rakhmawati, 2022). Children become the center of learning and are given the freedom to be creative in learning. The renewal of the independent curriculum at the PAUD level which is starting to be used in various schools is something interesting to research (Ngaisah et al., 2023). This study aims to determine how the Application of Science and Mathematics Learning to Build Early Childhood Learning Independence at Sayang Bunda Kindergarten, South Lampung, which has implemented the Independent Curriculum. This is important to do because the application of science and mathematics is very suitable to be applied to build learning independence, but conditions in the field show a lack of interest and attention given by teachers in implementing learning independence through science and mathematics learning which is certainly adapted to the age of children playing while learning. This research specifically examines the application of science and mathematics to build an independent learning curriculum for early childhood at Sayang Bunda Kindergarten in South Lampung and is expected to be a reference that the Independent Curriculum has enormous benefits and remains relevant to the times.

METHODOLOGY

This research method uses a qualitative approach. Qualitative research can show community life, history, behavior, organizational functionalism, social movements, and kinship relationships (Jhon W. Creswell, 2013). Primary data sources in this study are 40 students, the principal, and 4 teachers at Sayang Bunda Kindergarten, while secondary data sources are curriculum documents and some documentation of children's play activities. The data collection technique was carried out by interviewing the principal and teachers, observing science and math learning activities to build independent learning and documentation of activities and curriculum documents contained in the school. Furthermore, the stages of data analysis techniques are by reducing data, presenting data, and drawing conclusions from the data that has been collected. At the data reduction stage, researchers select and sort the data that has been collected by adjusting to the needs or research questions that must be answered through data collection. Meanwhile, data presentation is data taken from the results of data reduction and is data that answers research questions. Finally, conclusion drawing is done to conclude whether the data obtained answers the problem formulation or there are new facts obtained from various information that has been collected through observation, interviews and documentation.

RESULTS AND DISCUSSION

Early Childhood Education is an effort to stimulate and stimulate newborn children up to the age of six which is done by providing educational stimuli to help children's growth

and development, both physically and mentally so that children are ready to enter further education (Shofia & Dadan, 2021). Learning is a process carried out by individuals to obtain a new overall change in behavior, as a result of the individual's own experience in interaction with their environment (Risaldy, 2014). In this activity the teacher sets learning objectives, learning materials, learning strategies, learning indicators, learning materials, learning strategies, learning media to learning evaluation. (PURNAMA, SIGIT, Hayati, 2020). Science and mathematics are one of the lessons that can be introduced to children from an early age. Early childhood is able to accept simple science and math concepts. The introduction of science and math to children needs to be given in the right way and the selection of activities that are in accordance with the level of child development. (Safira Rizki Ajeng, 2020). To develop their potential, an activity is needed that can develop and optimize each stage of child development. Play is a fun activity that is done on the basis of pleasure and without considering the end result and is done voluntarily with stages of development starting from the manipulative, symbolic, exploration, experiment and recognizable stages (Wiwik Pratiwi, 2017). Play and games can make a positive contribution to early childhood development, namely being able to develop all aspects of development which include aspects of religious morals, socio-emotional, language, cognitive, physical motor and also art. In addition, there are also objectives, characteristics, functions, benefits and stages of early childhood play development and are also equipped with play and game requirements and examples of games that can stimulate aspects of development in children (Siti Nur Hayati & Putro, 2021). Without realizing it, children's play activities can provide an assessment to educators or parents. To what stage is the child's development? This assessment can be seen when children are busy playing and without the child realizing that he is being observed in the process of growth and development (Rohmah, 2016).

Math and science concepts and skills can be acquired when children engage in traditional early childhood activities such as playing with color rain science, sinking and floating on the water theme, balloons inflating without blowing, geometry math, counting fingers with pictures and children's math play activities with fruit bags, and outdoor activities (Lind, 2011). Giving children the opportunity to see math and science in everyday activities helps them build basic understanding and interest for future learning. Based on the results of observations and interviews conducted by researchers at Sayang Bunda Kindergarten, South Lampung, it can be described that the application of science and mathematics learning to build independent learning is as follows: First Application Educators prepare games and equipment including color rain science, sinking and floating on the theme of water, balloons inflate without being blown, geometry mathematics, counting fingers with pictures and children's math play activities with fruit bags then educators organize the environment as best as possible and provide various types of science and mathematics learning media, with the aim of attracting children, children love to play and learn as desired so that learning independence for children will be realized.

The second application of direct learning implementation was carried out at Sayang Bunda Kindergarten in South Lampung including The first game played was the child putting an egg in water without salt, the child observed and conveyed the egg was large, and sank, then the child tried to put a spoon of salt in the water, the egg seemed to be still sinking, then another child conveyed his idea that the salt put in had to be a lot so that the egg was different. Students are also seen to be able to use science and mathematics

materials around them with environmental arrangements that have been prepared by educators with different displays with various media from science and mathematics learning, which aims to attract children's desire to explore their imagination in independent learning, children can repeat play activities until they find creative ideas or critical thinking, get new experiences and others, and do not depend on children's worksheets that only use one type of learning media.



Figure 1. Floating egg sinking science play activity

On this occasion, children are given the opportunity to play, explore their imagination and be one with nature. When playing, children are very curious to participate in several varied play activities such as in the activity of children doing science activities of floating and sinking an egg using egg media, water, salt, spoon, cup, glass.



Figure 2. Early childhood Geometry Math play activity

The second play activity is recognizing geometry shapes using geometry jumping games in the high category, while inferentially there is a significant increase in geometry shape recognition ability. So, it can be concluded that geometry jumping games improve children's geometry shape recognition ability and this media can be used in the learning process.



Figure 3. Science play activity Balloons inflate without being blown up

Furthermore, the third experimental activity is that the balloon expands without being blown, it can be seen that children can optimize the use of their five senses seen during experiments, children explore according to their wishes, show their learning independence, stimulate children's creativity, imagine that balloons can be large without having to be blown, and train their thinking skills.



Figure 4. Children's math play activities with Counting Fingers

The fourth play activity is children's math play with counting fingers children are seen to be creative, sharpen children's reasoning, make children more critical, help children understand the surrounding environment better and instill honesty and discipline.



Figure 5. Color Rain Science Children's Interest Activity

The fifth play activity rain science rain color proves to children that water and oil can not be fused because of the difference in molecular properties while water and dye can be

fused. In this activity, it can be seen that children have high curiosity, critical thinking and high willingness to learn. provide opportunities to learn by exploration and trial and stimulate children's cognitive abilities, children gain knowledge about rain and cause and effect relationships, and children can love science knowledge. With the freedom of learning experienced by children, the results obtained exceed the objectives of the program that has been compiled in the planning, extraordinary work produced by children during play. When children play freely that is where children feel freedom in learning so that in the teacher observation assessment is very concrete or real data obtained,



Figure 6. Children's math play activity Fruit Bag

In the sixth play activity which is the last activity of the game is the fruit bag, it appears that children can recognize how to classify and also this game does not endanger children, children can also learn while playing. In addition to children becoming familiar with numbers. Educators do not need to make up an assessment. Furthermore, the third application of science and math learning is that educators conduct assessments with anecdotal records and collection of work. The results of the work produced from children's freedom to choose, modify, play activities using various science and math learning media reflect the freedom of learning for children. freedom of learning for children will be able to be built from the provision of interesting science and math learning media so that the learning atmosphere is fun and not boring. Educators can also observe that each child has a difference in choosing, determining the preferred play activities and freely exploring according to the initial instructions, with the differences produced from the child's work therein lies that science and mathematics learning provides varied stimuli provided by educators, so the speed of thinking of students also varies.

Children begin to construct many concepts during the pre-primary period, including math and science concepts. They also develop processes that allow them to apply newly acquired concepts, extend existing concepts, and develop new concepts. The use of these concepts also helps them understand more complex concepts in mathematics such as multiplication, division, and the use of standard units of measurement to build learning independence. (Bennett., William, 2023)

Children always ask questions that require concrete answers to measure the level of success or achievement of child development educators determine the indicators used in the daily learning program that educators have prepared before implementation.

CONCLUSION

Based on the research results obtained from the interview process, documentation and observation, as well as discussion of the research results, it can be concluded that the

Application of Science and Mathematics Learning to Build Independent Learning for Early Childhood Kindergarten Sayang Bunda South Lampung which has implemented an independent learning curriculum is very relevant to be used today. Based on the research findings, there are 3 research findings on the Application of Science and Mathematics Learning to Build Independent Learning for Early Childhood Kindergarten Sayang Bunda South Lampung which has implemented an independent curriculum divided into three parts, namely simpler and deeper, more independent, and more relevant and interactive. In the independent curriculum, the material is presented more essential and as much as possible the new concepts they acquire can be related to the problems around the child. Learning is delivered simply and deeply, meaning that it is not done in a hurry. This is so that students can absorb the material more deeply. Learning is also designed in a fun way and method, making students more focused and interested in learning.

More independent As the name implies, learning in this independent curriculum is carried out more freely. The concept of "independent learning" gives teachers the freedom to design learning based on the needs and learning outcomes of students. Learners are also given the freedom to choose and determine the desired learning activities. In early childhood education units, learners are given the opportunity to discuss, choose and determine the play activities to be carried out. The needs in learning and playing are also adjusted to the results of discussions with children. The concept that is carried out with science and math learning provides space and time for students to explore their abilities and knowledge in a series of work in science and math.

More relevant and interactive Learning in the independent curriculum is carried out with more relevance to the conditions of children and the environment around children. Learning is also created interactively, involving learners with a greater role in the learning process. One of the learning models that can support the relevant and interactive concepts that teachers can do is through the application of early childhood science and mathematics. Science and math learning helps learners to become more active in reinforcing meaningful play activities as a learning process. stimulating how they think critically, independently, collaboratively, to the ability to solve problems, so that learners will be better prepared to face the challenges of their day and real life in society

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