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Collaborative Play Needs Analysis: Introducing Mathematics to Early Childhood

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Abstract: In the 21st century, learning has become an inevitable demand in education. It is likely to happen for young children in learning the initial mathematics. This research article describes the stimulating strategies of collaboration skills among early aged-children in learning mathematical concepts. The study is set to analyze the learning needs of mathematical concepts in early childhood through collaborative play. Collaborative play in early childhood to introduce mathematical concepts becomes important because introducing mathematical concepts is not just related to drilling. Through collaborative play, children can develop cognitive abilities by understanding mathematical concepts with members of their group. This research is a need analysis study with a descriptive qualitative approach. Data collection techniques were carried out through literature studies, observations, interviews, and questionnaires. The results showed that children need to be encouraged to do collaborative activities in solving mathematic problems in different ways.

Keywords: collaboration, early mathematical concepts, early childhood.

協作遊戲需求分析：將數學引入幼兒

摘要: 世紀的學習成為教育的必然需求。幼兒在學習初級數學時很可能會發生這種情況。本研究文章旨在描述幼兒在學習數學概念時協作技能的刺激策略。這項研究旨在通過合作遊戲分析幼兒期數學概念的學習需求。在幼兒期合作引入數學概念變得很重要，因為引入數學概念不僅與鑽探有關。通過協作遊戲，孩子們可以通過與小組成員建立對數學概念的理解來發展認知能力。本研究是一項採用描述性定性方法的需求分析研究。數據收集技術通過文獻研究、觀察、訪談和問卷調查進行。結果顯示，需要鼓勵孩子通過不同的方式解決數學問題，進行協作活動。

关键词： 協作; 早期的数学概念; 幼儿期。

1. Introduction

Indonesia will get a demographic bonus in the 2015-2035 range. At that time, the population of Indonesia, about 70% are of productive manpower. It means that the Indonesian people will have considerable human resources. It will be very beneficial for the nation's civilization because, at a productive period, energy, body, and soul are still excellent as a source of strength for products, which will undoubtedly influence the sector's economic growth and national progress. What will happen if we have a generation of quality and can answer the challenges of his day?

Therefore, human development is needed starting from now, where early childhood children today will be the generation that determines the fate and future of the nation. Early education's role becomes crucial in developing human quality [1]. In the research organization of the State Organization for Economic Development or Organization for Economic Co-operation and Development (OECD), the PISA score explains that children who have a history of attending preschool activities get higher scores than those who participate in preschool shorter. It means that education at an early age positively contributes to children's literacy skills in mathematics, language, and science.

Mathematics is a basic ability that every person needs to support success in all aspects of his life; this is because mathematics provides literacy of numbers as an important foundation for school achievement, in the profession, and in many aspects of life. Mathematics will provide many opportunities for success [2], which can be introduced early. It is because mathematics is one of the materials that require direct practice [3]. Teachers can introduce mathematics fun [4] through various strategies [5], including collaborative learning.

Collaboration is one of the needs that generations must have in facing the 21st-century era [6]. Early childhood is in the process of development and growth [7]. So early on, children need to be stimulated to learn to collaborate. It is because collaborative learning influences children's social behavior [8]. Introducing collaboration with children can build negotiation skills [9]. Besides providing opportunities for children to have a learning experience [10], that is contextual. Children get new things in their learning experiences.

Most learning practices use class management in groups in the field study but are still oriented towards children's success. It means that children are still working alone, with a culture of competition that does not stimulate the ability to cooperate or even collaborate. Collaboration in question is that children in the class can work together, foster each other, learn and change together, and move forward [11]—This situation will be needed in today's global world—likewise, the low PISA and TIMSS scores [12]. There needs to be a change in curriculum preparation [13], including curriculum adjustments and teacher perceptions in introducing mathematical concepts to early childhood so that children have readiness in further education. The research results explain that children do not have Readiness in mathematics [14]. Mathematics is part of learning to read, write count (calistung), which is still a polemic in Indonesia [15]. Therefore, introducing mathematical concepts can begin at an early age, since children in early childhood education [16, 17]. Encourage children to collaborate with peers [18]. It is consistent with Vygotsky's view [19] that children can develop their cognition by engaging in social interaction and play [20].

2. Method

This research used a qualitative approach and a descriptive quantitative approach. Qualitative data collection techniques were conducted through observation, interviews, literacy studies, and documentation. While quantitative data were collected from the questionnaire results, and clinical observation instruments were checked lists. Validation was carried out based on the expert's discussion, content, and construct to obtain instrument validation. Reliability was carried out using two observers and processed with interpreter reliability techniques.

3. Result and Discussion

They conducted interviews with school principals and teachers based on field study data through observations on the learning process at Early Childhood Education (ECE) institutions. Besides that, a questionnaire was also given to teachers in Solo Raya. A literature study is used to conduct studies on several theories about early childhood learning and research on the characteristics of early development in completing their developmental tasks. Collaborative Stimulation Based on collaboration observations, teachers rarely do stimulation in the class. Management in ECE classes is set in group seating, where each group can consist of 5-6 children. However, the activities carried out are oriented towards completing independent tasks. Usually, in the opening, the teacher starts by greeting and leading the child to focus on learning. The teacher begins to focus on learning by discussing the day's theme. After that, the teacher gives several tasks, which the child must do individually. In groups of tables and seats have different responsibilities. Children move from one group to another to complete the task. Some peers gave their friends help to complete the task because of self-initiative or encouragement from the teacher. In addition to learning models in the classroom, teacher stimulation in children can be in games with several children, such as relaying with specific tasks. This game trains the cohesiveness and cooperation of children.

The description of learning above can conclude that the dominant child is accustomed to doing activities independently, and a learning culture can create a competitive climate. Furthermore, on the other side, the teacher stimulates the child to work together, helping each other. The concept is different from collaborative activities. Several things are essential in collaborative activities. In collaboration, all equal participation and roles are needed in a group. Second, the teacher does not intervene and lets the children organize themselves and complete their tasks. Next, the teacher is also not recommended to evaluate the group process. Preferably group members themselves learn from what they have learned in collaborating with their peers [22] —not being grouped means sitting only close together but working individually in completing tasks. The concepts of collaborative and cooperative learning are both done in groups. The cooperative learning model emphasizes cooperation in solving problems and applying knowledge and skills according to learning objectives, whereas collaborative learning emphasizes collaborating to achieve goals. In collaboration situations, each member is interdependent with the other. Each member has their role [23]. Therefore, in learning, teachers are expected to conduct stimulation to improve children's ability to collaborate through collaborative games [24].

3.1. Early Mathematical Concept of Learning in Early Childhood

Based on observational data, interviews, documentation studies, and questionnaires given to teachers, it can be described that there is no separate curriculum for learning mathematics in the curriculum of ECE institutions. Nevertheless, that does not mean the concept of mathematics is not introduced in ECE institutions. The structure that builds the 2013 ECE curriculum consists of moral values, language development, physical and motor development of children, emotional, social development, artistic development, and cognitive development. Introducing early mathematical concepts becomes part of cognitive

development in the ECE curriculum. The material provided to children in analyzing mathematical concepts includes (1) Introduction of numbers 1-10. (2) Addition. (3) More / less. (4) Get to know numbers. (5) Counting. (6) Memorize numbers. (7) Group/pair. (8) Pattern (forward image). The material uses direct practice methods or strategies, assigning tasks, telling stories, playing, questioning, answering, and doing LKA. Based on observations in class, children prefer learning by direct practice than using paper-based child worksheets. However, based on observations, many teachers still stimulate children with child worksheets, as illustrated in graph 1.



Fig. 1 Children's Enthusiastic Level based on the strategies given by the teacher

The introduction of mathematics can be given from an early age [25, 26]. The National Council of Mathematics Teachers provides recommendations on several significant themes covering (1) Numbers and operations, which include calculation, comparing, adding and subtracting, combining and decomposing, grouping and place values (2) Geometry which includes shapes, transformations, and symmetries, visualization and imaging of space, location, direction, and coordinates. (3) Measurement (5) Algebra, pattern, and data analysis.

At present, it is still polemic in ECE to teach reading, writing, counting. Reading writing counting is a prohibition on the practice of early childhood learning. Still, it is necessary to introduce children to necessary abilities such as reading and writing, and counting as a literacy of numbers and literacy. Providing a variety of literacy can provide a foundation for readiness towards the next stage of the process [27]. School children's availability based on ministry data reaches 74, 51%, which means that among ten children, Indonesia, seven children have adapted to the world of education [28].

Nevertheless, in the field of mathematics, some facts that explain the low ability of children both PISA results, TIMSS and strengthened by [28], in 2016 based on the assessment of Indonesian student Competency (SCAI) grade V children have the low ability in the field of mathematics (77.13 %) reading 46.83%, and low science as many as 73, 13%, and in 2019,

assessment of the ability of Indonesian students in class IX, shows children have low mathematical skills around (79.44%), in the reading field by 55.85% and science at 66.11%. The data explains the need to introduce mathematical concepts and provide numeracy literacy in children early. If examined more deeply, the problem is not with children being prohibited from reading, writing, and arithmetic for various reasons. Some literature and research indicate that early children are ready to accept the introduction of early mathematics through various methods and media appropriate to the age and needs of early childhood.

The method is carried out according to stages of early childhood development is through play by providing a variety of experiences related to and integrated with the learning environment. Through interaction, children will experience real activities directly so that meaningful experiences occur.

4. Conclusion

The above description can be concluded that introducing mathematics provides literacy in children early. It offers various literacy to children to prepare developmental tasks for the next stage. In introducing the initial mathematical concept, collaborative learning can stimulate it. Collaborating in solving problems with group friends in mathematical activities will form good social character and help them meet future challenges. Collaborative learning in ECE institutions has not done

much research to stimulate various aspects of ECE institutions' development.

This article has outlined the main needs of introducing mathematics early. Teachers use several methods such as drilling through a child's worksheet, giving assignments related to mathematical concepts, doing QandA, and direct practices such as counting and mentioning the number of objects. Children prefer activities that involve hands-on activities about math practices.

Mathematical activities in introducing mathematical concepts include counting, comparing objects with fewer or more numbers, pairing, and getting to know geometric patterns and shapes. The teacher gives instruction and demonstrations in the completion of activities. Teachers mostly facilitate individualized child activities. This means that children are expected to complete activities independently. Introducing mathematics is part of giving literacy to children from an early age. Offer a variety of literacy to children to prepare for developmental tasks to the next stage.

The description above can be concluded several things in introducing mathematical concepts—first, children like activities related to direct activities in introducing mathematics. Activities involving mathematical concepts in the child's daily activities will be more interesting than drilling activities by providing several tasks that the child must complete.

Second, early childhood begins to be interested in things outside of him. The surrounding environment provides ample space for children to explore, manipulate, and interact with their peers. In this situation, the child can be stimulated to participate in collaboration games with peers. Teachers can present activities that provide opportunities for children to explore with the environment and friends, for example, inviting children to make fruit juice together. Such activities can be carried out to explore and manipulate mathematical concepts. Children can be introduced to early mathematical concepts through collaborative learning. Collaborating in problem-solving with group mates in math activities will form a good social character and help them face future challenges. Collaborative learning in PAUD institutions has not done much research to stimulate various aspects of PAUD institutions' development. This model can be implemented by adjusting the school situation according to the theme developed through problem-solving. Children learn to build logical and logical thinking on their exploration activities rather than present to build children's symbolic thinking skills in their cognitive development.

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