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DEVELOPING MATHEMATICAL ABILITY BY USING GAMES IN PAUD NURUL HIDAYAH, ACEH BESAR

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Abstract
The problem identified at the Nurul Hidayah PAUD in Aceh Besar was that the learning process to develop mathematical ability was not yet organized through games or play activities. In addition, the introduction of mathematics was done based on figures and numbers. As a result, the student's didn't develop other creative abilities such as forming patterns, making comparisons, and estimating. Mathematical ability needs to be developed in early childhood because it will be the foundation for mastery of mathematical concepts at higher levels of educational. The object of mathematics is abstract. In order to develop early childhood student mathematical ability, the applications of methods that are fun and stimulating are necessary. This can be accomplished by using games. One solution to the problem mentioned above was trialed through classroom action research. The formulated problem was how to develop early childhood student mathematical ability using games at the Nurul Hidayah PAUD in Aceh Besar. The data was collected using classroom observations. Games were introduced and played in three cycles consisting of playing patterns, playing classifications, and playing numbers. The data were analyzed descriptively and qualitatively. The results from the study show that games were effective to develop early childhood mathematical ability in students at Nurul Hidayah PAUD in Aceh Besar: Teaching-learning was done using story-telling, task-giving, demonstrations and contests

Keywords: *Mathematical ability, games, early childhood.*

INTRODUCTION

Mathematical skills are part of the cognitive abilities that need to be developed in early childhood as a part of preparation for further education. The other reasons are as concluded in research by Bloom (1981, in Suyadi, 2015, p. 33) that early childhood children's intelligence development undergoes an escalation up to 80%. Furthermore, the research by Hunt (1983, in Suyadi, 2015, p. 32) concluded that getting education in early childhood will create long-term learning memory that can be recalled for a long time even in adulthood. Because of that, all the potential of early childhood needs to be developed, and mathematical ability is one of them.

Early childhood cognitive development is still on the level of pre-operational. Because of that, using the media of play is necessary for the learning process of mathematics, by allowing children to work and to learn individually and in a group. The mathematics' learning process is done in an integrated manner through learning themes that are close to the contexts of children's lives and their real experiences. Learning mathematics in early childhood does not push children to master counting and summation, but this is the result of the introductions delivered by various games and play activities (Hurlock, 1998, p. 27).

The principle of learning while playing must be applied for developing the mathematical ability of young children. As stated by Risaldy (2014, p. 7) teachers have to provide play activities that include educative elements so that the young children unknowingly learn and the learning activities themselves are fun.

The problem identified at Nurul Hidayah PAUD in Aceh Besar was that the learning process to develop mathematical ability was not delivered through games or play activity. Besides, the introduction of mathematics was done only with figures and numbers. As a result, the student's didn't develop creative abilities such as forming patterns, comparing, and estimating.

Based on the problem mentioned above, the problem for this research was how to develop mathematical ability through games at Nurul Hidayah PAUD in Aceh Besar? Consistent with this problem, the purpose of this research was to develop the mathematical ability through games at Nurul Hidayah PAUD.

METHODS

This research was intended to develop mathematical ability in young children through games. The main goal of this classroom action research was to improve the quality of classroom practice; in this case to improve the quality of the teaching-learning in order to develop mathematical ability through games.

This study used a qualitative approach, according to the characteristics for qualitative research, as stated by Moleong (1996, p. 4), that the study is natural. Subjects of this research were 15 children in group B (5-6 years old) at Nurul Hidayah PAUD, consisting of 9 boys and 6 girls. The data was collected from the performance of the research subjects using observation techniques. The data was analyzed qualitatively. According to Miles and Huberman (1994, p. 24) the steps of data analysis are data reduction, data display, data verification and conclusions. The research was done in three cycles, with each cycle consisting of four stages. The stages corresponded with Arikunto (2010, p. 24) they were: planning, action, observation, and reflection.

In the planning stage of each cycles, the researcher prepared: 1) The Weekly Lesson Plan (RPPM), 2) The Daily Lesson Plan (RPPH), 3) The Rating Instrument, 4) The Equipment for Educational Games (APE), 5) The Observation Sheet and 6) The Play activities. The Play activity in cycle I was playing patterns, in cycle II it was playing classifications, and in cycle III is was playing numbers. The APE that was prepared was numeral cards to build geometrical patterns, materials to string up, miniature animals and domino cards.

In the action stage of each cycle, there were various actions. The actions in cycle I was playing with patterns with the learning goal to find patterns by arranging objects to make shapes, match colors, or match the size. Action I used APE for building geometrically. Action II used APE for stringing up things. Cycle II was play activities for classification. The learning goal was for the students to develop the ability to classify objects based on shapes or on colors or on size. Action I used an APE with miniature animals, and Action II used an APE for building geometrically. Cycle III was done with play activities using numbers. The learning goal was to develop the ability to understand the concepts on numbers and of figures. Action I used an APE with numbered cards and Action II used domino cards.

During the teaching-learning processes observations were done by the research team as well as by the teachers at Nurul Hidayah PAUD. The observers recorded the learning activities and performances of the children using the observation sheets. These observations became the basis for the reflections.

The reflection stage was done with the observers in order to analyze the learning process that had been done. The results from the reflections became the input for further improvement of the learning process during the cycles that followed.

RESULTS AND DISCUSSION

The data was obtained from the observations of the student's during the 3 cycles. The actions corresponded to the lesson plans in which each cycle had different activities. The implementation of each cycle took 3-4 days.

The activities in cycle I were playing with patterns with the goal that the students develop the ability to find patterns or arrange objects according to their shapes, colors or sizes. Action I used an

APE with geometrical blocks to continue building geometrical patterns e.g.: as shown in Figure 1 below:

Figure 1. Task: Pattern to be continued: arrangement of Geometry Building.

The learning process was done using demonstration method. The children were asked to continue the same pattern with more blocks. Every student was given a chance to try to arrange the objects in order to form a pattern. Action II used an APE for stringing up objects. The teacher demonstrated how to make a bracelet and also a necklace from beads, e.g.: with the pattern of 4 reds, 2 yellows, 4 reds, 2 yellows, and so on to make a bracelet or a necklace.

Figure 2. Forming a bracelet or a necklace from beads.

Students were also asked to string up based on the size.

Figure 3. To make a string based on size.

Students were given the freedom to string up beads in whatever pattern they liked with as many beads as they wanted. Based on the observations the children developed the ability to arrange beads based on a pattern, so they developed creativity and the ability to recognize a number of objects.

Cycle II was play based on classification. The goal was to develop the ability to arrange objects based on shapes, colors, or sizes. Action I used an APE with miniature animals. The activity started with the story of a farmer who had various farm animals. During the story, students were asked to put the miniature animals into their own cages to help the farmer. The teacher also asked students to group the animals in their own way with reasons for their grouping. Action II used an APE with geometric shaped blocks. The teacher asked the students to collect the same kind of geometry into separate containers. Action III used beads. The activity was to make bracelets from beads of the same color, so there would be a red bracelet, a yellow bracelet, and so forth. Based on the observations, the ability to classify objects was developed.

The activity in Cycle III was playing with numbers. The goal was to develop the ability to understand numbers and figures. Action I used an APE with number cards which are shown in Figure 4 overleaf. The research findings of Ahmad, *et al.* (2016, p. 498) have shown that, "Introducing numbers to young children using numbered cards can be done with stories, games, and contests". Game can be done as contests, eg: ask the student to mention some numbers and pair them on a group of objects, or vice versa. Ordering numbers 1-10 or 10-1, and complete the known order of numbers. The contest in Action II used an APE with domino cards. These domino cards had a number of objects on the left of each card and a figure on the right of each cards. The students were asked to arrange the cards so that the figure on the right of the card corresponded to the number of objects on the left of the card on the card to the right, so the number of objects matched the figure (see the domino game example in Figure 4 that follows overleaf):

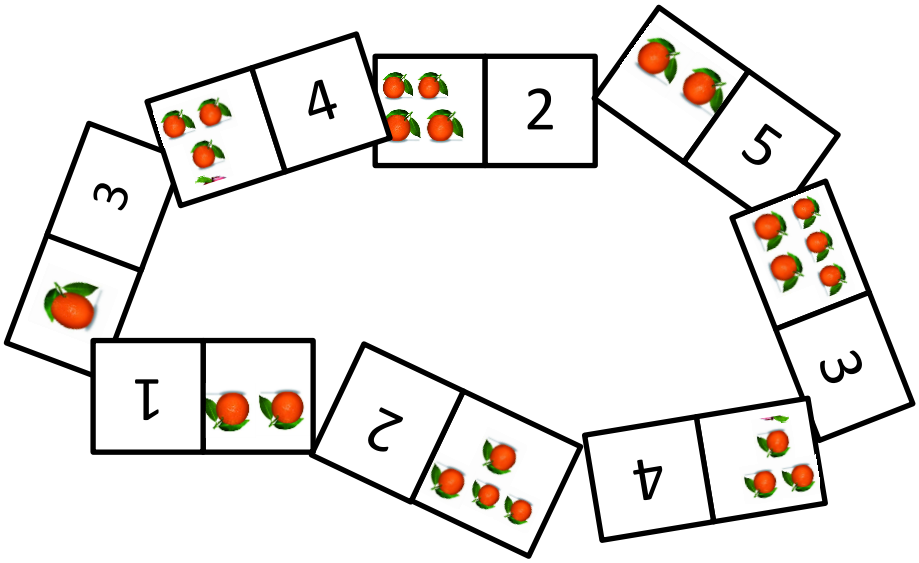

Figure 4. Example of a Domino game.

Thus the ability of these young children with concepts of numbers and figures was developed. Besides, through the contest activities, they also developed the attitudes of sportsmanship.

Overall, to develop the mathematical skills of young children through play can be done through learning by doing, learning by stimulating and learning by modeling. The conducted playing besides develop the math skills also has impacted to several other aspects. As Sari (2013, p. 112) has said play activities can develop social, emotional and cognitive skills and can stimulate children's creativity.

CONCLUSION

Based on results, conclusions can be made as follows:

1. Developing the mathematical ability of young children using games at Nurul Hidayah PAUD in Aceh Besar was effective when done with story-telling, task-giving, demonstrations, and contests.
2. Through methods using storytelling, demonstrations, task-giving and simple contests, teaching-learning occurred in a natural, relaxed and fun-filled process.
3. Besides, these methods also developed sportsmanship, creativity, and imagination amongst very young students.

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