Developing Numeracy Skills by Using Numbers Lottery Game

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Abstract
This study aimed to describe: mathematics instruction by using numbers lottery game, numeracy skills of children after participating in instruction, and values that develop during the mathematics instruction. The method used is a qualitative research with the type of case study. Research subjects were the children of B1 class in one kindergarten in Bandung city, headmaster, and teachers who teach in the classroom. The data required are obtained through: observation, interviews, and document analysis. In order to obtain a conclusion, the data collected were processed using interactive analysis. The results showed: numbers lottery game happened naturally according to the abilities of each child, so the children excited to add and subtract numbers obtained through shaking; numeracy skills of children on six indicators measured were at the level of good or very good; and values that developed during the mathematics instruction were at the level began to develop or habituated.

Key words: Numeracy skills, Kindergarten, numbers lottery game, values.

Introduction
Early childhood education is a pre-school education which introduces the climate and culture of the school, as a foundation to develop the potential of children optimally by using education, when they were aged 0 to 6. This is in accordance with UU Pendidikan No 20 tahun 2003 bab 1 pasal 1 butir 14, "Early childhood education is a development efforts aimed at children from birth to the age of six years are accomplished by providing stimulation of education to help the growth and development of the physical and spiritual so that children have the readiness to enter further education". Kindergarten is one means formal education which very important for a young child. Kindergarten has two characteristics: first its function as a preparatory event for the children to enter the school; second as a garden, it is expected to provide comfort and pleasure for children.

Early childhood characterized by curiosity and a desire to experiment. The high curiosity will be met if the kids receive stimulation, motivation, or directives in accordance with their development tasks. It's a loss if we do not take advantage of the high curiosity of children by not teaching them math concepts, whatever the reason. Vygotsky says "Children have their own preschool arithmetic, which only myopic psychologists could ignore" (in Sarama, 2009, p. 3). Of course, learning of mathematics for children kindergarten must be adapted to the principles of preschool education, which is learn while playing and play while learning. Fedriyenti (2012) conducted a class action research entitled "Capacity Building of Early Childhood Mathematics by Using Smart Clock Game in Taman Kanak-Kanak Pembina, Kecamatan Barangin Sawahlunto. The conclusion was by playing smart clock the mathematical abilities of children increased from cycle to cycle.

Meanwhile, according to UU SISDIKNAS No. 20 tahun 2003, "education is a conscious and deliberate effort to create an atmosphere of learning and the learning process so that learner is actively developing his potential to have the spiritual power of religion, self-control, personality, intelligence, character, and skills needed by him, society, nation, and state". Providing early childhood education is one way to establish the characters and their personalities for the foreseeable future. Thus, early childhood education should be organized in a holistic manner, not only emphasize the cognitive aspects, so that children could develop good values.

Based on the background that has been described, researchers are interested in doing research on the application of one of the games as mathematics instructional media in kindergarten, with the title "Developing Numeracy Skills by Using Numbers Lottery Game". The formulations of the problem in this research are: 1) How to use numbers lottery game as a learning tool to count? 2) How numeracy skills
of children after participating in the mathematics instruction by using numbers lottery game? 3) What develops values when children learning mathematics by using numbers lottery game?

Research Method
The research approach is the qualitative research, "Qualitative research is characterized by its aims, which relate to understanding some aspect of social life, and its methods which (in general) generate words, rather than numbers, as the data for analysis", Brikci and Green (2007, p. 2). The research method is case study, in accordance with the opinion of Neale, Thapa, and Boyce (2006, p. 3), "a case study is a story about something unique, special, or interesting stories can be about individuals, organizations, processes, programs, neighborhoods, institutions, and even events ".

The case study is divided into the four stages, namely: 1) Defines and designed the study, 2) develop instruments and collect data, 3) Analyze the data and draw conclusions, and 4) prepare reports. The first stage is to define and design the research by reviewing the development of theories or concepts to determine the case and designing research procedures. Development of theory and concepts used to formulate research questions. The second stage researchers made preparation of instruments and validation, followed by data collection. Analyze the data and draw conclusions are the third stage. This stage is used to check the correctness, relevance or significance of the concept or theory that has been developed or underlying research. The final stage is writing, disseminating and publication the results. The report is addressed to the providers of funds and institutions where researchers serve.

Location and Subjects
Location of the research is one of state kindergarten in Bandung. Research was conducted in the second semester of school year 2015-2016, precisely in April-May 2016. The subjects in this study were children in B1 class consisting of 8 girls and 9 boys. Besides the children, other research subjects are the headmaster and the teachers who teach in the class.

Data Collection and Analysis
Data required is collected through observation, interviews, field notes and document analysis. Observation is done since children enter kindergarten until they go home, not only when children and teachers play numbers lottery game. Interviews were conducted to headmaster and teachers, to complete data in kindergarten learning, especially mathematics. Field notes is used to record the findings during the research, which is not documented in the observation sheets. The documents taken for the analysis are: syllabus, daily program plan, and students’ workbooks. There are two types of observation results: about numeracy skills, and about values. Numeracy skills data were analyzed based on the criteria applied in kindergarten curriculum appropriate in 2004. Those data measured quantitatively by 1-4, and qualified as: less, enough, good, very good. Value that appears was analyzed based on the quantity and quality of the appearance; measured quantitatively by the percentage, then qualified to categories: not seen, emerging, began to develop, habituated. The data from interviews and documents analysis used to complete the discussion.

Overall, the analysis technique used is the technique of interactive analysis. The step consists of several components that related to each other: collection, reduction, presentation, and conclusion/verification of data. Data reduction is the process of selecting, determining focus, simplify, summarize and remodel the existing data in the field record. Once the data is reduced, the next step is the presentation of data analysis. Presentation of data directed to the data reduction results organized and systematically arranged. Furthermore, researchers compile the relevant data as a set of structured information, which gives the possibility of making conclusions and taking action.

Results and Discussion
The instruction happened from 07.30 a.m. until 10.00 a.m. Children who came faster could play to take advantage of facilities such games: seesaw, swing bench, round bowls, or super slide. Separate mathematics learning is usually done in the area of mathematics. Nevertheless, before entering the area of mathematics teachers almost always teach various math concepts at the beginning of daily learning. Various activities provide an introduction to mathematical concepts are: 1) count the children who were present and who have not attended by using a finger; 2) by using a finger to compare the number of children who were present and who is not present; 3) sang together about numbers and counting; 4) compares the size between the classroom and schoolyard, etc.; 5) examine the objects that exist in the classroom and school environment, then mentioning their geometric shapes, 6) answer teacher's question about the addition or subtraction of numbers 1-20, who else could answered could start the game, or go out of the classroom to break or go home.
Numbers Lottery Game as a Learning Tool

Numbers lottery game is quite simple, requiring only two pieces of glass covered with paper and contains rolls of paper with numbers. Before playing, the children were divided into groups consisting of four children, guided by a teacher. To illustrate the course of the game, the following will be presented the dialogue between teacher and children of the Apple group. The names are written here are fictitious names.

Teachers prepare two cups, each containing 10 rolls of colored paper that is labeled with the number 1, 2, 3, ..., 10. The teacher shuffles the first glass, then pulled out a roll of paper from the glass, and put it in Tita’s hand.

Teacher: Open the scroll Tita! What's your number?
Tita: unrolled, then said, 4 Mam!
Teacher: Correct. Write down the number you got on your workbook, Tita!
The teacher shuffles the second glass, then pulled out a roll of paper from the glass, and keeps it on Fikri’s hand.
Teacher: Fikri open the paper roll! What's your number?
Fikri: unrolled, then said, 8 Mam!
Teacher: Correct. Fikri, write the numbers you got on your workbook!
The game resumed after Fikri finished writing.
Teacher: Tita, who gets the bigger number: you or Fikri?
Fikri: Me
Teacher: Quiet Fikri, now Tita’s turn to answered
Tita: 8 + 4 = 12 Mam!
Teacher: Try to count again dear! 8 in the mouth, four in hand
Tita: 8, (then held up four left fingers, and she started counting: 9, 10, 11, 12 till all of her finger is calculated). Finally she answered 12 Mam!
Teacher: (clapping her hand) Exactly, good Tita, 100 for you.
All of the children in the apple group clapped hands.
The teacher reminded Tita and Fikri to write: "8 + 4 = 12" in their workbooks.

The learning process occurs naturally and fun. Next Dafa’s and Rani’s turn, the last two apple’s group member remaining. The shaking process was until numbers writing in the workbook run fast. Moreover, Dafa and Rani can add 3 and 9 (numbers they got) correctly in a short time, without command. Dafa and Rani also agreed, that 9 is more than 3. This advantage is used by teacher to learn the subtraction operation by using numbers lottery game.

Teacher: Dafa, can you count 9 - 3?
Dafa: Yes, the result is 6 Mam!
Teacher: Try to explain to your friends, use your fingers boy!
Dafa held up nine fingers, then he counted backwards: 8, 7, 6.
Teachers give praise to Dafa, and rewarding applause for all children.

Teachers give opportunities for replaying to several children who could not smoothly add and subtract. Of course, the difficulty level of the game set by the teacher, such that all the children can play with pleasure, and they can learn math according to their respective capabilities. Nothing to lose, because children who have high ability given the higher challenge than his friends who have the low ability. After providing a sort of reinforcement and reflection, numbers lottery game ended.

The game is repeated on the next meeting. Glass was filled with 20 rolls of paper with the numbers: 1, 2, 3, ..., 20. Children learned how to sum and subtract numbers 1-20. Sometime teachers have to shuffle up to three times to help children for getting small number, so they could easily add or subtract that numbers. This does not apply for Nanda, the smartest boy in the class. Nanda has no problem to operate numbers 1-20. He already mastering to count numbers to 100, not only in addition and subtraction, but also multiplication.

It can be concluded, numbers lottery game in kindergarten was naturally done according to the abilities of each child. Everyone excited and enjoyed the learning process to add and subtract numbers 1-20. This situation is achieved because teachers implement clear rules, and determine the proper destination. This can be explained by the Oldfield opinion (Wiersum, 2012, p. 23), “mathematical games are...
'activities' which: involve a challenge, usually against one or more opponents; are governed by a set of rules and have a clear underlying structure; normally have a distinct finishing point; have specific mathematical cognitive objectives”.

**Numeracy Skills**

Indicators of numeracy skills used in this study is that the child can: 1) pronounce numbers 1-20 sequentially, 2) make a sequence of numbers with objects 1-20, 3) pair numbers symbol with objects 1-20, 4) state the result of additions with objects 1-20, 5) state the result of subtraction with objects 1-20, 6) distinguishes two objects which are equal and not equal, more than and less then. Assessment is done refer to the criteria applied in kindergarten appropriate in curriculum 2004, namely: 4 = 76% - 100% = Very good, 3 = 51% - 75% = Good, 2 = 26% - 50% = Enough, 1 = 0% - 25% = Less. Numeracy skills of kindergarten children after participating mathematics instruction used Numbers lottery game as media will be presented in Table 1.

**Table 1.** Numeracy skills of kindergarten children after participating Mathematics instruction by using Numbers Lottery Game

<table>
<thead>
<tr>
<th>No</th>
<th>Assessed Aspect</th>
<th>Result</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>pronounce numbers 1-20 sequentially</td>
<td>v</td>
<td>Very Good</td>
</tr>
<tr>
<td>2</td>
<td>make a sequence of numbers with objects 1-20</td>
<td>v</td>
<td>Very Good</td>
</tr>
<tr>
<td>3</td>
<td>pair numbers symbol with objects 1-20</td>
<td>v</td>
<td>Good</td>
</tr>
<tr>
<td>4</td>
<td>state the result of additions with objects 1-20</td>
<td>v</td>
<td>Good</td>
</tr>
<tr>
<td>5</td>
<td>state the result of subtraction with objects 1-20</td>
<td>v</td>
<td>Good</td>
</tr>
<tr>
<td>6</td>
<td>distinguishes two objects which are equal and not equal, more than and less then</td>
<td>v</td>
<td>Very Good</td>
</tr>
</tbody>
</table>

Of the six indicators measured, three indicators at the level of Good, and three indicators at the level of Very Good. This achievement is higher than the performance demanded by the curriculum 2004, namely: "count/mention the number order 1-20, count (recognize) concept of numbers by objects up to 10, making the sequence of numbers 1-10 with objects, connecting/pair numbers symbol with objects up to 10 (children are not told to write), differentiate and create a collection of objects which: the same amount, not the same amount, more then, and less then; state the results of addition and subtraction with objects up to 10, estimate next order after seeing the shape of more than three sequential patterns, For example: red, white, and blue; imitate the patterns using a variety of objects”

**Values Growing During The Instruction**

Character education has a role and functions that are strategic for the whole nation and state of Indonesia. According to Darmu'in (2013, p. 46), "content of character values in kindergarten curriculum accordance with the Permendiknas number 58 of 2009 contained in all aspects of development, both in terms of habituation and in aspects of basic capabilities, but textually the values of these characters more listed in the habituation aspect, namely the development of habituation is an activity performed continuously in daily life, so that students become accustomed to doing good behavior ".

This study did not specify any values that will be developed. During the study, it seems that many good values were emerging and develop naturally. Furthermore, based on the quantity and quality of the appearance, these values were scored using the criteria by Darmu'in (2013, p. 62). There are four criteria, namely: "BT= Belum Terlihat (Not Seen), if students do not show early signs of behavior that is expressed in the indicator; MT= Mulai Terlihat (emerging), if students have started showing early signs of behavior that is expressed in the indicators but have not been consistent; MB = Mulai Berkembang (began to develop), if students already exhibit a variety of behaviors expressed in indicators and began to consistently); and MK= Memiliki Karakter/Membudaya (Having Character/habituated), when children constantly exhibits behavior indicators expressed in a consistent manner. The values that developed during mathematic learning are presented in table 2 below.
Table 2. The values that developed during the instruction

<table>
<thead>
<tr>
<th>No.</th>
<th>Values developed</th>
<th>Score</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Obediently follow the rules</td>
<td>MK</td>
<td>Have Character/habituated</td>
</tr>
<tr>
<td>2.</td>
<td>Critical</td>
<td>MB</td>
<td>Began to develop</td>
</tr>
<tr>
<td>3.</td>
<td>Autonomy</td>
<td>MB</td>
<td>Began to develop</td>
</tr>
<tr>
<td>4.</td>
<td>Confidence</td>
<td>MB</td>
<td>Began to develop</td>
</tr>
<tr>
<td>5.</td>
<td>Care</td>
<td>MK</td>
<td>Have Character/habituated</td>
</tr>
<tr>
<td>6.</td>
<td>Patient</td>
<td>MK</td>
<td>Have Character/habituated</td>
</tr>
<tr>
<td>7.</td>
<td>Respect for others</td>
<td>MK</td>
<td>Have Character/habituated</td>
</tr>
<tr>
<td>8.</td>
<td>Concentration</td>
<td>MB</td>
<td>Began to develop</td>
</tr>
</tbody>
</table>

During follow mathematics instruction by using lottery numbers game, there are eight values observed emerging and developing in children's. All eight values are: Obedient to follow the rules, critical, independent, confident, caring, patience, respect for others, and concentration. Four of the eight values got the highest score, which is habituated; while four others got began to develop score. It can be concluded, learning mathematics by using numbers lottery game can help foster good values in children's kindergarten.

This is in accordance with the opinion of Peng and Nyroos about mathematics instruction and Davies opinions about the advantages of using the game. Values in effective mathematics lessons from students' perspective are: "personalized help, explanation, quietness, collaboration, sharing, strictness, concentration; explanation, independence, relaxation, quietness, fun" (Peng & Nyroos, 2012, p. 418). Meanwhile, educational benefits of using games in instruction according to Davies are: "provide a meaningful learning situations, support students to build a positive attitude such as providing opportunities for students, motivate students to learn, build a self-concept and developing positive attitudes towards mathematics, increase learning by adding more formal activities, create more interaction between students, give students opportunities to self-assessments, and improve students problem solving skills. It consider as "interactive learning tasks for both school and home and allow students to operate at different levels, and make students can work independently" (Al-Mashaqbeh & Al Dweri, 2014, p. 135).

Conclusions
Based on the research findings and the results of data analysis, the researchers concluded: 1) Numbers lottery game happened naturally, according to the abilities of each child, so the children excited to add and subtract numbers obtained through shaking; 2) Numeracy skills of children on six indicators measured were at the level of good or excellent; and 3) Values that developed during the instruction were at the level began to develop or habituated.

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