

The Use of Creative Traditional Games to Increase the Children's Calculation Skills

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Abstract

Education is the main foundation to achieve the country's advancement. A good and affordable education enables a country to create people's better quality of living through advancing their intelligence. Meanwhile, there are many poor people living in the slums who cannot afford the education because of the expensive tuition fee and these results in the jolt of dropout numbers among the slumbers.

Such phenomenon was found in the group of slumbers living on the side of Code River, Yogyakarta, Indonesia. The writers found that one the effects of this phenomenon was the children's low scores in calculation skills that became the primary consideration for the writer to conduct this study.

This study was aimed to increase the calculation skills of children by using creative traditional games. The creative traditional games are *dakon*, *nekeran*, *pathilan*, *kubuk manuk*, and *pasaran* and the other games that the writer intentionally developed, namely *kotak poro-poro*, *bundaran hitung angka*, *carilah aku*, *salah? coba lagi!*, and *pelangi matematika*.

The writers employed classroom action research to 24 children at the 1st, 2nd, and 3rd grade of primary school in Jogoyudan, Kali Code, Yogyakarta, Indonesia. A pretest was given at the first meeting and portfolios were given during the study. The result showed that the creative traditional games increased 25.6% of the children's addition skill, 32.7% subtraction skill, 70.3% multiplication skill, and 119.5% division skill.

Keywords: calculation skills, creative traditional games, children

1. Introduction

As stated in preamble of UUD 1945 (Indonesia Constitution 1945), education is the main foundation in to achieve the country's advancement. However, many people cannot experience good education because of poverty. In Indonesia, people are struggling to

experience good education. As stated by Inggried and Akuntono in Kompas newspaper (2011), “10,268 million students (primary and secondary school) could not finished nine-year compulsory education and about 3,8 million student could not continue their study to senior high school because of the incapability to demand tuition fee.” It is a real phenomenon faced by the people in such modern era.

There is an area called Kali Code in Yogyakarta, Indonesia, where the people lived closely to each other and they do not experience good education. Mr. Wawan as a chairman of RW 08 Jogoyudan, Kali Code said that 90 percent of the people in Kali Code did not graduate from middle school and only 10 percent could continue their study to the university level because of the economy problem. Another problem was stated by Mr. Cahyono, a chairperson of Kali Code Community. He said that due to the parents’ inferior education background, the children in Kali Code had low skors in their schools, especially in mathematic subject. It is also supported by Mr. Wawan who said that the average of the mathematics score of primary school children grade 1, 2, and 3 in Kali Code were 50 and it did not achieve MMC (Minimum Mastery Criteria), which is 75.

In fact, mathematics is related to calculation skills and it can build the critical thinking and logical thinking of the children. It could also be used as an effective mean of thinking to view a problem happen as a problem to be faced and solved. It also means that the children can see every problem that they have something that can be solved. Furthermore, the children can face whatever problem that they have (Riedesel, Schwartz, and Clement, 1996).

Since the houses of the people in Kali Code are close to each other, the children do not have a enough space to play. Sumintarsih (2008), says that play is a preparation to the maturity, it is a concrete form of anxiousness and anger, and it is a real picture how the children become a creative adult. By playing the children work (Lewis & Bedson, 1999). Therefore, the limited space that is faced by the children should be solved so that they can play and work using those limited area. The children are too much exposed by the materials and they also do not get enough education from their parents which affect their frustration and their tiredness to study as supported by Prabantini (2008) that the children with demanding schedule and lesser attention make them frustation.

The problem of their inferior education and limited space encouraged us to conduct a study called “The Use of Creative Traditional Games to Increase the Children’s Calculation Skills”. The purpose of this study is to increase the children’s calculation skills through creative traditional games. By using creative traditional games, the children are able to recognize the causes and the effects of the problems when they are playing the creative traditional games so they can solve the problems. We assume that the theme of this study is different from other research, so that the authenticity of this research can be justified.

2. Main body

2.1 Research Problem, Objectives and Plan

In order to solve the problems that have been revealed in the research background, the researchers formulated two research problems. They are:

1. How does the children’s calculation skills increase through creative traditional games?
2. How effective is the use of creative traditional games to increase the children’s calculation skills?

Related to the research problem. The research objectives are:

1. To know how to increase the children's calculation skills through creative traditional games?
2. To know how effective the use of creative traditional games to increase the children's calculation skills?

The researchers employed the action research as the plan to increase the children's calculation skills. The action research was conducted because the researchers wanted to know how to increase the children's calculation skills and to know how effective the use of creative traditional games to increase the children's calculation skill in Kali Code is. It was inline with the statement of Stringer (2007), "Action research is a systematic approach to investigation that enables people to find effective solution to problem they confront in their everyday lives" (p. 1). Therefore, the researchers used action research as the main plan to employ the creative traditional games to solve the mathematics problems faced by the children.

2.2 Literature Review

Games

Games are highly related to the children because basically the children like to play games. As they play, the children work and they can experience, learn, and interact with their environment. Lewis and Bedson (1999) states, "Playing games is a vital and natural part of growing up learning" (p. 5). Through games, the children can increase their concentration, gain their awareness of their environment, and increase the children's motoric skill, develop their physic, mental, and moral (Sher, 2011). By playing games the children can develop cognitive ability (Mutiah, 2010). Games can also increase the students' interest and motivation so that they can involved in the classroom activities (Meletiou & Efstathios, 2012).

Traditional games

Traditional games are any kind of games which have been existed long time ago and they are inherited from generation to generation (Triyuda, Yuline, & Ali, 2013). Traditional games have many humanity and culture value (Akbari, et.al, 2009). Traditional games are one of the ways to restrain the modern games in the modern era. As stated by Eichberg (2005) that by playing traditional games, the culture or culture heritage are perserved and the region identity can be perserved. Eichberg (2005) also adds that traditional games are useful idea to promote the social function and health for those that played them because the games are played by some people and in traditional games the movement and the participation are needed.

Creative games

Creative games is constructed with various rules and modification and they are adjusted with the level and age of the children. The games also give the children happiness and they can practice the children's critical thinking. When the children play the creative games, they do not only use the mathematical operations, such as addition, subtraction, multiplication, and division, but also think about the way to solve mathematical problems so that they come with the logical conclusion (Prabantini, 2008).

Calculation Skills

Calculation skills is the ability to use logical reason and numbers (Triyuda, Yuline, & Ali, 2013). the calculation skills is related to mathematical operation, such as addition, subtraction, multiplication, and division (Desmawira, Sumekar & Rahmahtrisilvia, 2013). Those basic mathematical operation are always faced by the students when they do the mathematics problem. Triyuda, Yuline, & Ali, 2013.) also states that in order to increase the children's calculation skills, it is not only by giving them formulas or theory about

mathematics. The games can also become the solution to increase the children's calculation skills. Inline with the opinion of Triyadi, Imrayanti (2012) also states that the inferior of the children's calculation skills is because of the use of the uninteresting and unvaried method and strategy of teaching. Therefore, the interesting and fun methods are useful to increase the children's calculation skills.

2.3 Developing the Research Model and Hypotheses

This research employed the model of action research from Hendricks (2006). The action research model has three components: (1) reflect (2) act (3) evaluate. In the reflection step, the researchers found that the children had problems with their mathematics. The researchers proved the problem by giving them a pre-test. The results of the pre-test showed that their mathematics scores were below MMC. Then, the researchers came with the idea of the use of creative traditional games to increase the children's calculation skills. In the action step, the researchers employed the eleven creative traditional games for the children. Those eleven creative traditional games were used to motivate the children as well as to attract them to study mathematics. In the evaluation step, the researchers used the children's portfolio to see the increasement of the children's calculation skills. The hypothesis of this research is that the creative traditional games can increase the students' calculation skills. Therefore, the use of the creative traditional games can increase the children's calculation skills, such as addition, subtraction, multiplication, and division.

2.4 Population and Instruments

The population of this research was 24 children grade 1, 2 and 3 primary school aged 7-9 years old. They were from different schools in Jogoyudan, Kali Code, Yogyakarta, Indonesia. The instruments were a pre-test that consist of 15 mathematical problems on addition, subtraction, multiplication, and division and a portfolio which was compiled from the children's book reports.

2.5 Data analysis and model testing

The data were analysed by averaging the score of the portfolio of the children. The portfolio were used to provide the comprehensive assessment profile (Herbert, 2001). First of all, the researchers compiled all of the children's pre-tests scores. Then, the researchers classified the the score of their pre-tests into addition, subtraction, multiplication, and division. The results of the pre-test showed that the addition was 74, subtraction was 64, multiplication 58, and division 40. Then, the researchers compared them to the MMC. By comparing them to MMC, the researchers could see that the results of their pre-tests were below MMC. In order to prove the hypothesis, the researchers used traditional creative games. The traditional creative games is a compilation of some traditional games and the games created by the researchers. They are *dakon*, *nekeran*, *pathilan*, *kubuk manuk*, and *pasaran* and the other games that the writer intentionally developed, namely *kotak poro-poro*, *bundaran hitung angka*, *carilah aku, salah? coba lagi!*, and *pelangi matematika*.

Before the researchers applied the games to the children, each of the children was given a book to report their works as the portfolio. The book report was given when they started to play and they had to write their calculation result in the books after they finished the game. After the researchers applied those games to the children, the researchers compiled the scores from their book reports. The score from their books were used by the researchers as the portfolio results. Then, the researchers compared the result of the pre-test with the results of the portfolio from the children. The portfolio was resulted by dividing the calculation skills of each of the games into addition, subtraction, multiplication, and division. Then, the

researchers averaged each of the calculation skills of every game. After that, it was counted and finally, the average of each of the calculation skills are revealed.

2.6 The results of testing hypothesis

2.6.1 The way to increase the children's calculation skills

In order to increase the children's calculation skills, the researchers employed eleven traditional creative games. The games are:

1. *Pathilan*

Pathilan is a traditional game from Central Java, Indonesia. The player use some sticks (10-20) that they spread on a table or floor in which the children have to pick up the stick one by one without moving the other sticks. The game is over if all of the sticks have been picked by the player. The way to combine this game with mathematics is by giving points for each stick, for example 15. If the player (children) got five sticks, the mathematical operation is $15+15+15+15+15=75$. We can also say the subtraction is $75-15-15-15-15-15=0$, the multiplication is $15 \times 5=75$ and the division is $75:5=15$ or $17:15=5$.

2. *Dakon*

Dakon is a traditional game from Yogyakarta, Indonesia. This game can be played on the ground or by using a board called *dakon* and the seed called *kecik*. *Dakon* is a long rounded board with seven holes facing each other and *kecik* is a seed of sapedilla. If you do not have *kecik*, you can replace them by the other beans or small rocks. Two saving holes at both end of the board are called *lambung*. The seeds are put equally in each hole, except *lambung*. Two children play face to face and they have to pick the seeds from one hole and put the seeds into other holes clock wisely one by one. If the last seed enters the empty hole or *lambung*, the children's turn is over. The game ends if the seeds are all saved in *lambung*. The way to combine this game with mathematics is easy. Firstly, we let the children play with two seeds in each hole. After the children end the game, they have to count the seed in their *lambung*. Then, the children have to play with three seeds in each hole. After the children end the game, the children have to subtract the seed in their *lambung* with the seed they have previously. It continues until they play with five or seven seeds in each hole.

3. *Nekeran*

Nekeran is very familiar to the children, especially the boys. Long time ago, the children played this game by using small rocks. Nowadays, the children can play with glass or plastic marbles. The way to combine it with mathematics is very easy. Firstly, the children have to make three holes in ground or floor and value each holes, for example 20, 30, and 50. Secondly, the children take five or six marbles and throw them one by one. After throwing all the marbles, they have to count the number of marbles enter the hole. The winner is the children with the highest score.

4. *Kubuk Manuk*

Kubuk Manuk is a traditional game from Yogyakarta. This game uses various kinds of seeds that have glossy and slippery surface like peas, corns, peanuts, beans or soybeans. The game starts by spreading all the seeds on the floor. Mix all the seeds-peas, corn, peanuts, beans or soybean. Then, the children have to create a pistol using their hands. The little fingers, the ring fingers, and the middle fingers are crossing and the point fingers formed like a pistol. The children have to take the seeds one by one and enter them into their palm without dropping them. If the seeds fall, their turn should be changed by other children. The way to combine this game with mathematics is by giving score for each kind of seed, for example, the peas are 5, beans are 10, and peanuts are 15. Then, the children play the game. If all the children have got their turn, the game ends. Then, they have to count the seed that they get with the score of each seed.

5. *Pasaran*

In this game, we let the children play with their friends in a small simulating real market. Some children become the sellers and other children become the buyers. We can use the plastic vegetables, plastic fruits, or plastic kitchenwares and the money from monopoly game to play. In this games the children are free to buy anything that they want by using certain amount of money. The buyers have to fill a sheet of the items and the price of the things that they buy. While the seller fill in the sheet of the thing that they sell and the price of the items. After they got all that they want, the children count the item that they buy and give it to the mentor.

6. *Kotak Poro-poro*

Kotak Poro-Poro in Javanese means Division Box. This game uses small boxes and some seeds like beans, peas, or peanuts. The children are given seeds and boxes. They have to divide the seeds into small boxes one by one. This game is very useful to teach the children division. The seeds are the group to be divided and the boxes are the denomiators and the seeds which have been put in each box are the results of the division. For example, we give 20 seeds to the children, then, the children divide them into 5 boxes. It means that 20 are divided by 5 are 4 or $20:5=4$. In order to make this game more attractive, the teachers or mentors can sing a song together with the children when dividing the seeds into the boxes.

7. *Angka Sempurna*

Angka Sempurna or Perfect Numbers is a game which uses incomplete mathematical operations. For example, the teachers or the mentors show a paper written $25=5 \times 3 + \dots - 5$. The children have to fill in the blank correctly by writing the proper answer down on the paper or rising their hand and the teachers or mentors point the first rising hand children.

8. *Salah? Coba Lagi*

“Salah? Coba lagi!” or *“Wrong? Try Again!”* is a game to practice the children critical thinking when playing this game. This game is the same as *Kotak Poro-Poro* or Division Box. However, in this game the children are given a number of seeds that cannot be divided by the given box, for example: 10 boxes with 35 seeds. At this point the teachers or the mentors are not allowed to tell the children how to solve the problem, but the teachers or the mentors only say, “what do you do so the seeds are equally divided?” If the children are fast thinkers, the children can solve the problem by subtracting the boxes or subtracting the seeds or adding the boxes or adding the seeds. However, if the children are slow thinkers, stimulate them by asking “how if we subtract the boxes?” or “how if we add the seeds?” The crucial point is that all of the steps should be carried out by the children themselves.

9. *Carilah Aku!*

“Carilah Aku!” or *“Find Me!”* is a game which uses some flash cards. The flash cards contain mathematical operations including addition, subtraction, multiplication, and division, for example: $15 + 35$, 45×2 , $50 : 2$, $105 - 15$, ect. The teachers or the mentors said, “I am a mathematical operation. If you divide me, I become 50. Find me!”. After the children read/hear the statement, the children have to find the mathematical operations which the result is 50.

10. *Bundaran Hitung Angka*

Bundaran Hitung Angka is a game using a rounded cardboard to play. The rounded cardboard is divided into three parts and each part consists of three levels, for example the first level is 60, the second level is 70, and the third level is 80. The teachers or the mentors ask the children to find four mathematical operations which result is each level. Then, the children have to fill the level with four mathematical operation that they know. If the children successfully fill the level with correct mathematical operations, they can go to the next level. The level can be adjusted to their grade.

11. *Pelangi Matematika*

Pelangi Matematika or Mathematics Rainbow is a game using many colorful cards. Each card has a number starting from teens up to tens. The way to play it is that the children have to do mathematical operations by using the cards after the teachers or the mentors give the mathematical problem. For example, the teachers or the mentors ask, “Multiply the yellow rainbow with blue rainbow, or add blue rainbow with red rainbow”. The children have to do mathematical operations according to the order of the teachers or the mentors.

The eleven traditional creative games were interesting as well as to motivate the children to study mathematics. When the children were playing those games, they were happy. This is also the reason why the researchers used the games. It is supported by Meletiou and Efstathios (2012) that games can also increase the students’ interest and motivation so that they can be involved in the classroom activities.

2.6.2. The effectiveness of traditional creative games

Traditional creative games effectively increased the children’s calculation skills. Using the results of the portfolio of from the children, the researchers compared the results of the pre-test with the portfolio. The result of the comparison can be seen in the figure 1.

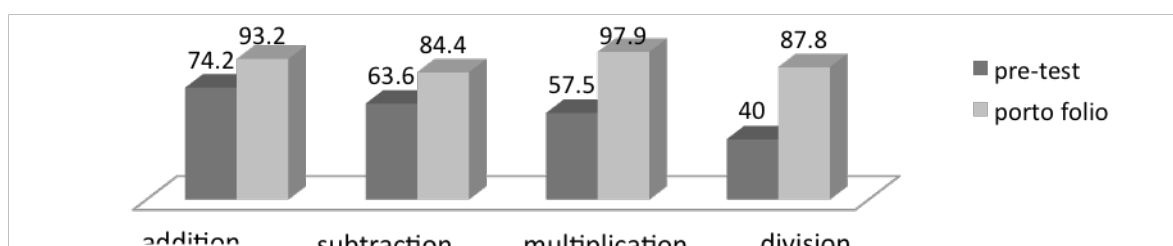


Fig. 1: The Grafik of the Children Calculation Skills.

The figure indicated that the average of the children’s addition was 74.2. Then, after the researchers employed the creative traditional games, the addition increased up to 93.2 percent. The subtraction was 64 before the researchers employed the creative traditional games. After the researchers employed the creative traditional games, the subtraction increased up to 84.4. The multiplication in the pre-test was 57.5 and after the researchers employed the creative traditional games, the multiplication increased up to 97.9. The division was 40 in the pre-test. Then, after the researchers employed the creative traditoinal games the division increased up to 87.8. If the researchers counted the percentage of the increasing of the calculation skills, the addition increased 25.6 percent, the subtraction increased 32.7 percent, the multiplication increased 70.3 percent, and division increased 119.5 percent.

2.7 Discussion and Conclusion

The research questions are answered by doing a hypothesis. The hypothesis of this research is that the creative traditional games can increase the children’s calculation skills. The participants of this research were 24 children grade 1,2 and 3 in Kali Code, Yogyakarta. The results of the hypothesis showed that there was an increasing of the children’s calculation skills by employing eleven traditional creative games. The eleven traditional creative games were *dakon, nekeran, pathilan, kubuk manuk, pasaran, kotak poro-poro, bundaran hitung angka, carilah aku, salah? coba lagi!, pelangi matematika, dakon, nekeran, pathilan, kubuk manuk, pasaran, kotak poro-poro*. According to Zulkardi (2011) that the traditional games could construct the children mathematic understanding because traditional games could truly show the number used to support the rule of the games. The creative games are used to make the children happy. The creative games were also made with rules that enabled the children

used their skill to solve the mathematical problems (Prabantini, 2008). Using the eleven traditional games, the researchers found that the children's calculation skills increased significantly. The children's calculation skills: addition, subtraction, multiplication, and division increased. They increased 25.6 percent of the children's addition skill, 32.7 percent subtraction skill, 70.3 percent multiplication skill, and 119.5 percent division skill.

2.8 Limitation and Further Research

Since the researchers cannot force the children to come to the class, the children who include in the research do not come consistently. Therefore, the researchers cannot see the increasing of all of the children's calculation skills. In order to solve the problem, the researchers take the book report of the children who often come to the class. The researchers hope that the other researchers who want to conduct the same research can engage and motivate all of the children to come to the class consistently. Furthermore, the other researchers who want to conduct similar research, the researchers can use the other traditional games from their own countries to increase the children's motivations.

3. References

- Akbari, et.al. (2009). The effect of Traditional games in fundamental motor skill development in 7-9 year-old boys. *Journal of Pediatrics*, 19(2), 123-129. Retrieved from <http://journals.tums.ac.ir>
- Eichberg, H. (2005). *Traditional games : A joker in modern development*. Retrieved November 12, 2013 from <http://www.playthegame.org/conferences/play-the-game-2005/conference-presentations.html>
- Hendricks, C. (2006). *Improving schools through action research: A comprehensive guide for educators*. Boston: Allyn and Bacon.
- Herbert, E. (2001). *The power of portfolios*. San Francisco: John Wiley & Sons, Inc.
- Imrayanti. (2012). The improvement of the children's calculation skills through mathematics box game in Padang kindergarten. *Children Learning*, 1(4),1-13. Retrieved from <http://ejournal.unp.ac.id/index.php/paud/issue/view/292>
- Inggried & Akuntono, I. (2011, December 26). Angka putus sekolah dan komersialisasi pendidikan. Jakarta Post. Retrieved October 20, 2012, from <http://edukasi.kompas.com>
- Lewis, G & Bedson, G. (1999). *Games for children*. New York: Oxford University Press.
- Meletiou, M & Efstathios. Proceedings of ICICTE '12: Game-enhanced mathematics learning for pre-service primary school teachers. Cyprus: University of Cyprus.
- Mutiah, D. (2010). *Psikologi anak usia dini*. Jakarta: Kenanga.
- Prabantini, D. (2008). (Trans.). *Creative games for kids*. Yogyakarta: ANDI.
- Riedesel, C., Schwartz, J., dan Clement, D. (1996). *Mathematics: Study and teaching (elementary)*. Boston: Allyn and Bacon.
- Sher, B. (2011). (Trans.). *Kiat melatih konsentrasi pikiran anak*. Jakarta: PT Index.
- Stringer, E. (2007). *Action research*. (3rd Ed.). London: SAGE Publications.
- Sumintarsih. 2008. *Permainan Tradisional Jawa*. Yogyakarta: KEPEL Press.
- Triyuda, D., Yuline, Ali, M. (2013). Introduce numeracy skills through traditional games congklak in children aged 5-6 years in kindergarten Sukadana State Trustees. *Journal of Education and Learning*, 2 (7), 1-9. Retrieved from <http://jurnal.untan.ac.id/index.php/jpdpb/article/view/2526>
- Zulkardi & Nasrullah. (2011). Building counting by traditional game: A mathematics program for young children. *IndoMS. J.M.E.* 2 (1), 41-54. Retrieved from <http://eprints.unsri.ac.id/624/>