Development of Pairing Card Learning Media to Improve the Ability to Recognize the Concept of Numbers

Abdus Somad; Myrnawati Crie Handini; Tjipto Sumadi

Doctoral of Early Childhood Education, Postgraduate University of Jakarta, Indonesia

Abstract

Media is a tool in conveying material to children. This study aims to improve the ability to recognize the concept of children's numbers by developing a media "pairing card". The research subjects were 50 children aged 4-5 years in DKI Jakarta. The research method used is research and development (R&D) with data analysis techniques through qualitative and quantitative. The pairing card learning media is developed through 4 main steps, namely introduction (analysis of needs and objective conditions), media development, media validation and revision, and media implementation. The pairing card media was tested with one on one, small-scale trials, and large-scale trials. The results showed that the pairing card media significantly improved the ability to recognize the concept of children's numbers. This study answers the question of developing media innovation, namely pairing cards which are effective in increasing children's ability to recognize number symbols, showing number symbols, mentioning number symbols, and comparing number magnitudes. Furthermore, this study also predicts the existence of other contributing influences, namely the playing techniques used in the pairing card media game.

Keywords: *Media Kartu; Pairing Card; Number Concept; Jakarta*

Introduction

Mathematics is a discipline that is very important in daily life (Östergren & Träff, 2013) (Li & Yang, 2010). Children with good math skills will be able to survive in social environments and have better cognitive abilities (Elliott, Jung, & Friedline, 2016). To have more complex mathematical abilities, the introduction of mathematics must start at an early age. The delivery of mathematics introduction material for Early Childhood must be adapted to the stage of development and cognitive maturity of the child, namely learning with concrete objects.

The ability to recognize the concept of numbers is part of early mathematics that must be developed by children. The importance of early mathematics education has become a concern in recent years (Jennifer, Margaret, & Leow, 2014). Initial experience with numbers and operations is the basis for

acquiring a broader range of mathematical concepts and skills. In daily activities the number is a symbol that cannot be separated from activities, for example the child will make tea drinks, the child will do calculations by measuring how much sugar will be used "one" spoon, "two" spoons, and so on.

Recognizing the concept of numbers, namely the ability of children to develop skills to recognize numbers, mention numbers, compare numbers, and calculate (Yilmaz, 2017). Furthermore, the ability to recognize the concept of numbers, namely knowledge of numbers, has a positive impact on the development of children's arithmetic abilities. This study also emphasizes the importance of learning numbers before children enter school (Östergren & Träff, 2013). This statement is supported by other research on developing number sense in pre-k with five-frames, namely the ability to recognize the concept of numbers, which can help children in obtaining high mathematical results in the junior high school class (McGuire, Kinzie, & Berch, 2012).

The ability to recognize the concept of number includes two things, namely remote counting and rational counting (Charlesworth, 2011). Rote counting is mentioning the names of numbers that have been stored in memory sequentially. An example is the child mentions the numbers 1-10 in sequence and there are no mistakes. Rational counting is naming a group of objects with numbers in sequence, for example "one" for the first object, "two" for the second object, and so on. Another opinion also states that the ability to recognize the concept of numbers in early childhood, namely numbers and operations, is to understand the concepts of numbers, numbers, sequences, how to represent numbers, one-to-one correspondence (that one object corresponds to one number), and counting. (Greenberg, 2012). Recognizing the concept of numbers in children is exemplified like the conversation between parents and children "look at you have two eyes, and so does mother, let's count" 1, 2 "," mother has more biscuits than you. See you have 1, 2, 3, and you have 1, 2. Then mom will eat one mother's biscuit. Now mom has the same biscuits as you !. The introduction of the concept of numbers in early childhood uses more concrete examples of this to help children's reasoning abilities that are not yet optimal.

In addition, the ability to recognize the concept of numbers for children aged 4-5 years is also characterized by symbolic abilities. It is in line with the following statement that the ability to recognize the concept of numbers in preschoolers depends on a variety of special skills including symbolic abilities, such as counting, cardinality, and number recognition. The ability to recognize the concept of children's numbers begins with number recognition, being able to count, say, and show numbers (Yilmaz, 2017).

Recognizing the concept of numbers is supported by an environmental planner that builds children's curiosity, enthusiasm and encourages children to recognize the concept of numbers in the playing process (Jackman, 2011). The process of introducing the concept of numbers to children can be done with games, children are not aware of learning but in fun conditions. For example, the teacher invites children to play snakes and ladders, in the game of snakes and ladders the child will roll the dice, the child unconsciously counts the number of symbols on the dice and indirectly the child is learning to recognize the concept of numbers. In addition, there is a link between games in early childhood and mathematics. *Australian Association of Mathematics Teachers and Early Childhood Australia [AAMT/ECA]et.al, 2006* stated that in play, children often explore mathematical ideas and processes that are very important for future math learning and arithmetic and math experiences for very young children should be built on children's play (Paz-Albo Prieto, Cvencek, Herranz Llácer, Hervás Escobar, & Meltzoff, 2017). Learning mathematics in early childhood requires strategies so that children feel comfortable with learning activities, for example, children are invited to play puzzles, this can hone their problem-solving skills, playing cards can help children recognize numbers.

Furthermore, playing makes children more focused and wants to be involved in an activity (Costa, Ermini, & de Siqueira Sigaud, 2019). The use of media in learning activities is also important so that children have high curiosity and are interested in being involved in it. The use of pairing card media

is an alternative in introducing the concept of numbers to children. Media pairing card refers to several definitions of card game. The definition of pairing card in managing the rule point of the game is that the card game means "You can lead one card from the pair. Players can invite opponents to score 2 points by pairing the cards they have, after which players can play the third card and collect 6 points. For example, if the player starts with 7, 7, 2, 6, leads 7. "in card games it can be understood that there are rules for the number of points to be earned.. (Bary Rigal, 2005).

Another understanding that supports the theory of pairing cards is The Pairs Companion which uses the term pairing up; pair two cards that touch each other. For example, if you catch 8 pairs, you score 8 points (Ernest, 2014). In other turn-based card games where the players arrange their decks in advance, carefully select cards to have the opportunity to exploit strong combinations later, it is emphasized that each player has the opportunity to be involved in playing and managing card packs. (García-sánchez, Tonda, Mora, Squillero, & Julián, 2018). as well as pairing cards, all participants may be involved and may even lead games that have been adapted to the learning material. Pairing cards also refer to A Game of Thrones: Second Edition Joust Card Game Tournament. For the first half, players are paired randomly. For regular level events, players can request TO not match with family members or travel partners, if possible, for the first round. Installation Example: John, Sara, and Brent all have 15 tournament points. Justin has 13 tournament points. Sara was paired against Brent because she was already playing alongside John, and John was paired against Justin because there were no players with 15 tournament points remaining. Judging from this game, it can be correlated to the pairing card that the game can be randomized first and then sorted according to the rules and techniques in the game (Martin, 2015).

Furthermore, referring to the Card Pairing Games for Selected Math 8 Topics, the media pairing card is a paired card game that will have a very good impact on children's ability to be involved in groups. The paired card game can also improve a child's academic performance on eight math topics (Ronald O. Ocampo, Glenor Ancheta, 2015). Media pairing cards are developed on the basis of games that involve teachers and children and have techniques that players must master. Media pairing cards are the result of pursuit media innovation by referring to various theories about media, games, and cards. From the initial term and it is coherent with the meaning of media and media games. Pairing cards are playing cards looking for pairs of two or more cards that are played with rules and techniques. The innovation of the pairing card media game is the technique of finding a partner with magic techniques so that children's curiosity is high.

Methodology

This research is a meida development with a Research and Development (R & D) approach. Data collection techniques used in this study were field notes, documentation, interviews and observations, and tests. The subjects in this study were 75 children aged 4-5 years. The data analysis technique of this research is qualitative and quantitative data analysis. The steps to develop pairing card media in this study are based on the media development process that has been prepared previously, namely Phase I preliminary studies assessing needs, Phase II planning and model development, Phase III Validation and Revision Stage, and Stage IV. Model Implementation. Below is a chart of the media pairing card development process.

Figure 1. Draft Model 2 development of Media Pairing Cards
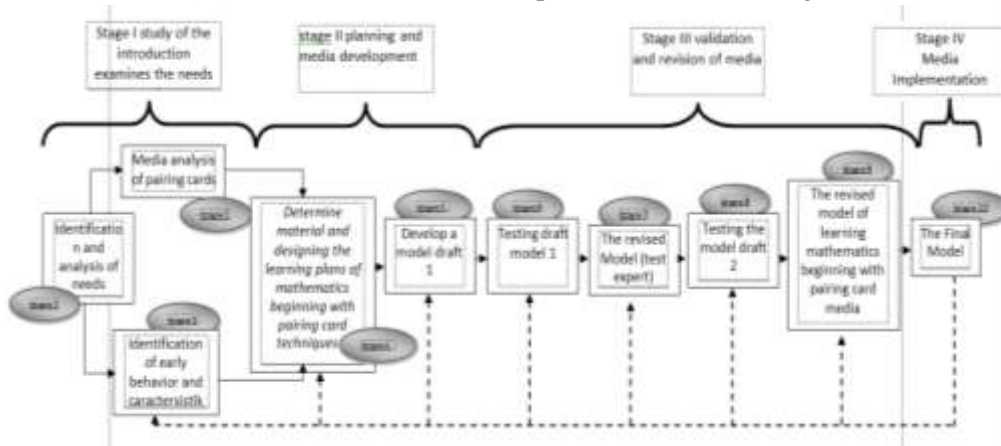
The research instrument in this study aims to test the effectiveness of pairing card media on the ability to recognize the concept of children's numbers after 4-5 years. The instrument used in this study is the result of a measurable synthesis of the various concepts that have been described. Furthermore, it was validated by three Indonesian lecturers to assess the quality of the item instrument in the early childhood mathematics field. Furthermore, the researcher conducted a trial to test the reliability and validity of the observation items. The instrument consists of indicators of the ability to recognize the concept of numbers for children aged 4-5 years, namely recognizing number symbols, mentioning number symbols, sorting numbers, and comparing the magnitudes of numbers. Then from the four indicators developed into statement items as many as 22 statements with a four rating scale, namely BB (Not yet developed) with point 1, MB (Starting to Develop) with pont 2, BSH (Developing according to expectations with point 3, (BSB) developing Very Well with point 4.

Result and Discussion

Paired cards were carried out by small class trials and expert validation. Suggestions and responses from experts are used to improve and revise and improve the model design (draft 2). So that the final revision is related to the revision of the appearance of the product to make it more effective and efficient and attractive to use. Below is the initial process of developing the media pairing card.
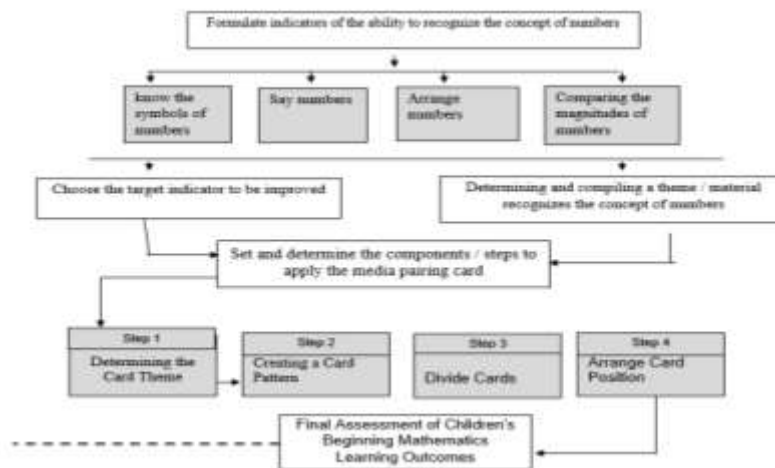
Figure 3. Final Media Pairing Card Model to improve the ability to recognize the concept of children's numbers

The final product consists of a pairing card media manual, a pairing media card, as well as the initial learning outcomes of mathematics.
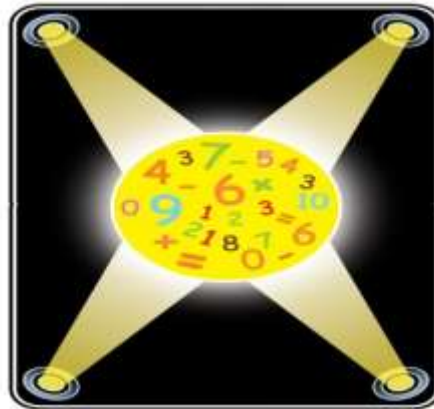

Figure 4. Guidebook

Figure 5. Card front page

Media pairing cards can be played by anyone, teachers, parents, and children who have understood the playing technique.

step 1:

arrange cards in pairs from 24 cards to 12 pairs
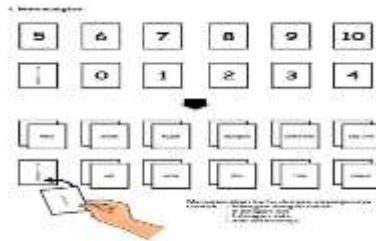
example: 0 with zero

1 with One

Etc

Figure 6. Arrange the Media Card Pattern Pairing card

Step 2:

Closing cards regularly starting from the lower left to the right one by one, left over right one by one

Closing cards regularly starting from the lower left to the right one by one, left over right one by one
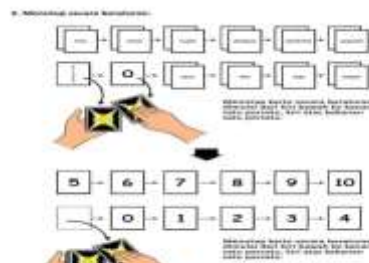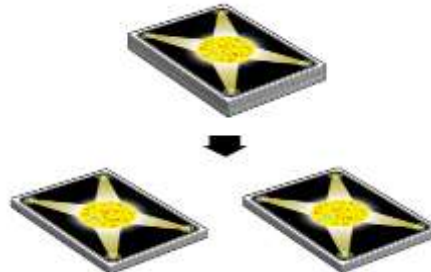

Figure 7. Regularly close the pairing card media

Step 3:

Dividing cards: cards can only be divided in two and may be repeated
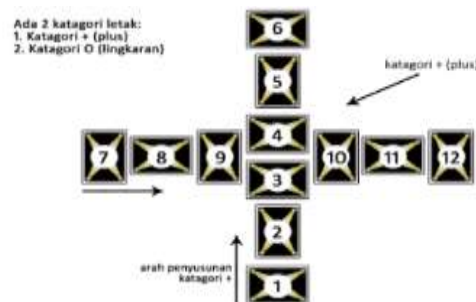

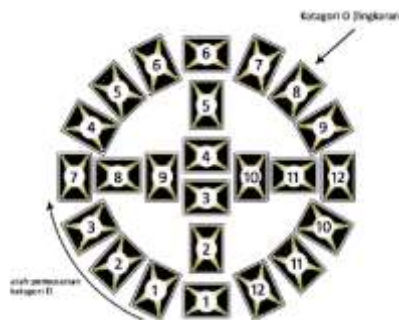**Figure 8.** Sharing a Media Pairing Card

Step 4:

Arranging cards: there are two categories of categories + (plus) arrangement from bottom to top 1-6, left to right 7-12
Category O (circle) circular arrangement starting from left circle + to bottom 1-12

Figure 9. Arranging the Position of a Media Card Pairing Card 1

Figure 10. Arrange the Position of the Media Pairing Card

To see the difference in the results of the initial and final assessment of the ability to recognize the concept of children's numbers was carried out using the help of the SPPS program with the paired sample t test formula which is a test of the difference between two pairs. Paired samples are the same subject but get different treatment. The processing results are as follows. The hypothesis proposed is:

Ho: the average ability to recognize the concept of children's numbers before and after the application of paired card media is the same.

H1: The average ability to recognize the concept of children's numbers before and after the application of paired cards is different.

Table 1. SPPS Summary Testing

Paired sample test	
Mean	8.320
Std deviation	7.267
Std deviation **7.267**	7.267
t 5.724	5.724

The value of t count is 5,724 with sig 0,000. Because sig <0.05, it can be concluded that Ho is rejected, meaning that the average ability to recognize the concept of children's numbers before and after the application of the paring card media is different. The conclusion; There is an increase in the ability to recognize the concept of numbers in Salsabila preschoolers, East Jakarta.

To see the difference in the results of the initial and final assessment of the ability to recognize the concept of child numbers, it is carried out using the help of the SPPS program with the paired sample t test formula which is a test of the difference between two pairs of samples. Paired samples are the same subject but get different treatment. The processing results are as follows. The hypothesis proposed is:

Ho: the average ability to recognize the concept of children's numbers before and after the application of media pairing cards is the same

H1: the average ability to recognize the concept of children's numbers before and after the application of media pairing cards is different.SPPS Summary Testing

Table 2. SPPS Summary Testing

Paired sample test	
Mean	16.737
Std deviation	16.737
Std deviation 7.267	7.070
Std Error mean	1.622

The value of t count is 16,737 with sig 0.000. Because sig <0.05, it can be concluded that Ho is rejected, meaning that the average ability to recognize the concept of children's numbers before and after the application of the paring card media is different. The conclusion; There was an increase in the ability to recognize the concept of numbers in Al-Azhar preschoolers.

The results of the second trial conducted in the two schools proved that the pairing card media that the researcher developed significantly improved early mathematics learning outcomes. So, based on the process carried out in model development and the results obtained from the application of the model, it can be concluded that the pairing card media meets the criteria of a good learning tool, namely having validity, being practical and effectively used. It is proven that when giving the treatment using pairing

card media, children are actively involved in the game of mentioning numbers, showing numbers, and sorting numbers. This is supported by the statement that the card media is very easy to use because it is physically small and can be played anywhere. Media cards can involve one or two more people in their use (Su, Cheng, & Lin, 2014). Other support for card media is having images that can be inserted with various content and games that make participants (children) interested (Turkay, Adinolf, & Tirthali, 2012).

During the activity to recognize the concept of numbers, children can see numbers quickly, for example, this is the number one. When the card is opened the child also mentions the number one. Likewise with showing numbers. With the pairing card media card game, counting numbers 1-10 by sequencing the numbers only through two games. When learning activities took place at the time of the research, card games were repeated and involved the children in selecting cards, then the children were guided to mention. This activity took place with fun. This finding is in line with the concept explained by Rambli et.al that the existence of games stimulates literacy and learning begins which makes children participate, think, find ideas and gain experience. (Rambli, Matcha, & Sulaiman, 2013). So it can be concluded that learning using card media will make it easier for children to improve their ability to recognize the concept of numbers.

The development of the pairing card media also includes games that use magic playing techniques. So that learning activities to know the concept of numbers is more interesting. In line with the results of the study, the impact of magic card media on learning activities as well as the use of pairing card media based on magic techniques states that playing cards with magic techniques can build children's trust in teachers and form children's curiosity towards media used (Jha, Raman, & Seshia, 2017).

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