# *How Does Domino Card Help Children to Insight Numbering*

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***Abstract*--This study explores the differences in the effectiveness of conventional educational domino media and contemporary digital educational domino media on the cognition of children aged 4-6 years. This research was conducted using R&D (research Research and Development) using the ASSURE model. 34 children aged 4-6 years and their parents were involved in the small socialization stage using a questionnaire conducted by Google Form. In this test, the researcher used SPSS 23 to test the feasibility of the media. The first test is the Validity Test of parents' perceptions and the results of children's cognitive abilities related to the ability to match number symbols with numbers for children aged 4-6 with a sig level of 0.05 with the results of r above (0.17) on each item being declared valid because r table > r count. The second test is the Validity Test of parental feedback on conventional educational domino media and contemporary digital education domino media with the results of r above (0.17) for each item being declared valid because r table > r count. The third test is the Cronbach's Alpha Reliability Test which results in the effectiveness of conventional domino media being 0.631, while the effectiveness of contemporary domino media is 0.516. The results of the cognitive abilities of children who use conventional media are 0.740, while the cognitive abilities of children who use contemporary media are 0.635. The fourth test is the Classical Assumption Test with the Normality Test, the sig value is above 0.05, the data is normally distributed, the homogeneity test is the sig value above 0.05, then the data is said to have the same variance (homogeneous). The fifth test is the Correlation Test with results less than 0.05 which means it has a significant strong relationship for conventional domino media 0.671 while for digital domino media 0.922. The sixth test is the Sample T-test with the results of the same contemporary media significance, which is less than sig 0.05. The result of the average score is that there is a difference in scores between conventional and contemporary domino media. Where the average score of contemporary digital domino media (27.76) is greater than conventional domino media (25.47). In this test, it can be decided if conventional and contemporary digital domino media are very effective in the ability to match number symbols with numbers in children aged 4-6 years.**

**Recent research confirms that the conventional and contemporary design domino media model has contributed to the improvement of children's cognition so that it is feasible and effective to use. Furthermore, this research has implications for the term positive benefits of digital media, where children's cognitive development is formed through game stimulation. However, gamification learning will be effectively implemented in fostering children's cognitive development.**

***Keywords: Children, Dominoes, Numbering***

## I. INTRODUCTION

Early childhood is a special individual, different, and has its characteristics according to the stages of his age. Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education System in Article 1 paragraph 14 states that early childhood education is an effort aimed at improving children from birth to the age of six years which is carried out through the provision of educational stimuli to assist physical and spiritual growth and development so that children have the readiness to enter further education (Fadlillah, 2014). However, UNESCO & UNICEF (2012:4) that early childhood is a child who is in the range of birth to the age of 8 years.

Early childhood is a golden age (Golden Age) which has great potential to train and develop various cognitive, physical, social, and emotional intelligence potentials of children, during the golden period is also the greatest growth period and at the same time the busiest period. It is necessary to use an approach in learning activities that focus on children (Mansur, 2011). In the golden age, children learn in various ways, including learning from experience, learning from the people around them or the environment, and children studying in institutions. Experience in early childhood has a very important role in the overall process of developing aspects of personality in the future.

Early childhood education programs must provide a stimulus to help the growth and development of children's attitudes, knowledge, and skills before entering a higher level of formal education. Leeuwen (Bima, 2013) childhood is the most critical period in cognitive and social development, language, and early literacy. Early childhood education must be recognized as the first step in integrating basic education into the national education system. Early childhood education should provide learning to stimulate social, emotional, physical, cognitive, and language development.

Educational units implementing early childhood education in the formal education pathway are in the form of Kindergarten and other equivalent forms using programs for children aged 4-6 years. Kindergarten children aged 4-6 years are in a sensitive period. Montessori believes that at the beginning of the year children grow through a sensitive period (sensitive period), during a sensitive period children will easily accept certain stimuli (Lillard: 2013). Early childhood education can provide opportunities for children to develop all aspects of development that are in themselves as a whole. The developing part of the child includes aspects of physical motor development, religious morals, social- emotional, art, language, and cognitive. In early childhood education, there has been a shift in thinking which in previous children's education aimed to prepare the academic field to enter the next level of education, so that early childhood education prioritizes and emphasizes the cognitive and language aspects of children. Today this thinking has changed towards child care and development.

Cognitive development (Khaironi, 2018). is the development of children in thinking and remembering from children to adults. Piaget stated that children actively construct their understanding of the world and go through four stages of cognitive development. Each stage is age-related and contains a certain way of thinking, a different way of perceiving the

world. Montessori (Ropnarine, 2011) views development as a series of "births" or periods of strengthening sensitivity, where each sensitivity gives birth to new interests and skills (Khaironi, 2018). Aspects of cognitive development in early childhood have determined indicators through the Standards for the Level of Achievement of Child Development which has been included in (Permendikbud 37 of 2014) according to age levels. Child Development Achievement Level Standards are criteria regarding the abilities achieved by children in all aspects of development and growth, including developmental and moral aspects, physical motor skills, cognitive, language, socio- emotional, and arts (Kemendikbud, 2014).

Aspects of cognitive development of children aged 4-6 years in the Standard of Child Development Achievement Level include learning and problem solving, logical thinking, and symbolic thinking. Indicators of logical or logical-mathematical thinking are showing reality or providing real examples so that children can show objects based on number symbols. Knowledge of mathematical logic is built when children play or manipulate the material around them. In addition, interactions between children and adults can also build this knowledge. When adults guide, ask, respond, react to children when they manipulate objects, the desire to learn mathematical logic will arise. Mathematical logic in early childhood can be developed in several ways, including playing, projects, storytelling, puzzles, questions, and answers, observing, matching, pairing, singing, and practicing. The world of children is playing because it is a fun activity for children. Playing is also a demand and need for Kindergarten children (Islamiyah, 2019).

Based on observations and interviews conducted by researchers with Muhajirin Tandes Kindergarten teachers in Surabaya and the Principal on 27 August 2019, it is known that the implementation of the activity of matching number symbols with numbers has been carried out but is still not optimal, due to the lack of interest of children in matching symbols. numbers by numbers because learning media are less attractive to children. Thus, through observations made by researchers, they found that cognitive optimization tends to be done by working on the Children's Worksheet which often makes children feel bored and bored. In this case, it can be seen that according to Miaso (Nursalim, 2013) media is everything that is used to convey messages that can stimulate children's thoughts, feelings, attention, and willingness to learn.

Sandiman (Azhari, 2018) learning media are everything that is used to convey messages from the sender to the recipient so that it can stimulate the thoughts, feelings, attention, and interests of children so that the learning process occurs. In the current era, the use of learning media has been widely carried out, especially learning to recognize the concept of numbers. With the media, children are more interested in learning and easier to understand the content of the message conveyed.

In an era of increasingly innovative learning, the presence of learning media is very mandatory. The use of objects as learning media is even broader in scope, ranging from the use of the surrounding environment to electronic equipment.

Learning media is divided into two, namely contemporary learning media and conventional media. It is said that conventional media are learning media made through human hands, the

operation does not use certain programs or applications, and serves as an intermediary means to convey material so that it is more easily understood by children. Contemporary media or digital media are media that are formed or operated using certain programs and applications (Udak, 2017). The most interesting counting learning media is dominoes. The learning media developed is a card game that contains pictures in the form of numbers and animals. By using concrete images, children can understand the concept that they want to convey more quickly.

A previous study by Sarah Aisyah (2014) entitled "Development of Number Cards on the Ability to Recognize Number Symbols 1-5 Children Age 4-5 Years" is a study that produces a prototype of a number card game product that uses cards containing numbers 1-5. A study (Brankaer, et al 2014) used domino number games in learning that only focused on understanding numbers for children with mild intellectual disabilities. As well as research conducted by Santos & Alves (2000) explains that through domino games, children can build their knowledge because when playing dominoes children are taught to recognize concepts, recognize rules, and interact directly and the media used is cards. dominoes. In the research conducted by Saroinsong (2016) entitled "The use of *children's gedged inhibited* interpersonal *intelligence* " and Saroinsong (2019) with the title "Excessive Internet Use and Control of Use Between Indonesian and Chinese Students," the results and conclusions were obtained that in this study most of the in 1x24 hours children using *gedged* can be more than four hours. From observations made at both elementary schools (SD) in Tambaksari can be concluded that children have more to do activities playing *gadget* which children are more fun than playing with his peers. Based on previous research, it can be concluded that the intensity of children when playing *biggest is* compared to playing with their peers, children prefer to spend a lot of time playing *biggest*. In this situation, it is necessary to develop a learning system in digital form, with the aim that children no longer play with gadgets for their benefit, but children use gadgets for their benefit in positive terms and remain under parental supervision. Therefore, the researcher raised the title "How Domino Cards Help Children in Understanding Numbers" to develop Educational Dominoes for ages 4-6 years with conventional media forms in the form of cards.

Researchers do not just stop here because in the era of technology 5.0 has become an important part of the world, researchers continue to develop Domino Education media into contemporary digital media for Android-based domino games by comparing conventional media with contemporary digital media where researchers will provide questionnaires to parents and children. get an assessment of the parents' responses through the distribution of questionnaires to determine the effectiveness of the media. Researchers chose to use domino media because domino media is more practical to use by children, domino media is more effective, and domino media will foster children's curiosity about game media that are considered new by them, how to play dominoes makes children able to optimize their cognitive, and also Domino is a medium that is very often used by adults but in this development, researchers made it so that children aged 4-6 years can also play with different themes. In line with a person's cognitive development according to Bruner (Lillard,

2013) occurs through three stages, namely the effective stage, the iconic stage, and the symbolic stage.

The media development in this study refers to two types of media, namely conventional domino media and digital domino media. For conventional domino media, the researchers used thick, lightweight ivory paper with an animal-themed design and included learning materials for matching number symbols with numbers for ages 4-6 years. Guide to playing it, children must be accompanied by a teacher, parent, or person older than their age. The first step before starting the game is to invite the child to sit in a circle, the cards are randomized by the teacher, parents, and people older than their age, distribute to the players, each player gets 4 cards, the remaining cards will be stacked in the middle of the position. In a circular seat, one card from the remaining distribution is placed next to the pile of cards from the remaining distribution as the start of the game, and each player must issue 1 card in a row. If he doesn't have a card in front of him, the child will take 1 stack of remaining cards. If the card taken is appropriate or not, the child is still not allowed to remove the card that has been taken. And so on until the remaining cards run out. For the evaluation of the score, the determination of losing and winning is determined through the remaining cards. If the remaining cards that were stacked at the beginning run out, the number of numbers in each card will be calculated. If the number is greater then it can be said to have lost and if the total number of numbers it has is small then it can be said to have won.

For contemporary digital domino media using Android with the Classic Board Games type which contains animal themes with learning material to match number symbols with numbers for ages 4-6 years. In this domino game application, children will play with opponents from the application. The game consists of 3 *levels of* successive play starting from *level* 1 which is easier to *level* 3 which is the most difficult. This game is done in stages, if level 1 cannot be passed then you cannot jump to the next level. Players can continue the game level if the child can get 3 stars. In level 1 children issue a total of 3 dominoes, for level 2 children issue a total of 5 dominoes, and for level 3 children issue a total of 8 dominoes. If the child's card does not match what is displayed when the child clicks on the existing card pile and only gets 1 card, and if the child gets the appropriate card or not, the child still cannot click back and will automatically switch to the opponent. For the evaluation of the score, the determination of losing and winning is determined in each level, the score obtained is a star. In level 1 if the child can play 1 card then the star gets only 1, if 2 is issued then the child will get 2 stars, and if the child can issue 3 cards then the child gets 3 stars and can continue to the next level. For level 2 issue a total of 5 cards. If only issued 1-2 cards the child gets 1 star, if the child takes out 3-4 children get 2 stars, and if the child manages to issue 5 cards then the child will get 3 stars. At level 3 available 8 cards. If the child can issue 1-3 cards then the child gets 1 star, to get 2 stars the child takes 4-7 cards. If the child takes out 8 cards, the child gets 3 stars. The time given for level 1 is 1 minute 30 seconds, for level 2 it has 2 minutes 30 seconds and for level 3 the child has 5 minutes, if it passes the specified time limit, it cannot issue a card at all then the application will automatically restart in the first menu.

The benefits obtained in the development of conventional domino media and digital domino media are in the form of theoretical benefits and practical benefits. For theoretical benefits,

the results of this study are expected to be able to provide ideas for media renewal in Kindergarten which continues to develop according to the demands of the times and the needs of children's development, provide scientific contributions to utilize existing technology in improving children's cognitive abilities, and as a reference for further researches. associated with improving children's cognitive abilities. For practical purposes, this research can be useful for researchers to be able to increase the knowledge and abilities of researchers to be able to develop knowledge in providing early childhood learning. For early childhood educators, it is hoped that it can be used as a school to innovate in providing interesting learning services for children in Early Childhood Education that can be easily accepted by students. For children, it is expected to foster interest in children in getting to know something new and train the ability to match number symbols with numbers in children. Parents are expected to be able to make it easier for parents to channel new knowledge for children and provide fun for children, especially when outside of school.

In this research, there are assumptions of limitations in research. For assumptions The basic assumption that is believed to be true by researchers so that it does not need to be proven again because it has become the basis of research in reaching the problem. In this case, the research assumptions are: An innovative media is needed in teaching and learning activities, a media that can make children interested in teaching and learning activities is needed, educational domino media can be used easily because educational domino media can be used as a fun game, and educational domino media can be used as a fun game. Educational dominoes can be used as a solution as a tool to match number symbols with numbers in Kindergarten education. For the limitations of this research, namely: There are limitations in the research to avoid widespread development and also avoid misunderstandings and common understanding, the researchers provide these limitations, among others: The material in the media content is only limited to matching number symbols with animal-themed numbers related to large numbers, and numerical, educational domino media is used for children at the age of 4-6 years, and the research is only carried out limited to the dissemination of limited groups (schools) with a minimal number of samples.

## II. METHODS

The type of research is research and development. Sugiyono (Sulistyo, 2019) explains that research and development (R&D) is a research method used to produce certain product designs, test the effectiveness and validity of designs that have been made so that these products are tested and can be used by the public. . Producing certain products is used for research that needs to be analyzed and tested for effectiveness so that the product can be used by the community. Meanwhile, Nana Syaodih Sukmadinata (Putra, 2018) R&D is a step to develop and perfect an existing and accountable product.

In this case, development is carried out to obtain breakthroughs that are used to develop conventional domino media and contemporary digital domino media based on Android so that the media developed is more practical, economical, efficient, and beneficial for advances in the field of early childhood education technology. This study aims to examine and determine the differences in the effectiveness of conventional and contemporary digital educational domino media on the cognition of children aged 4-6 years.

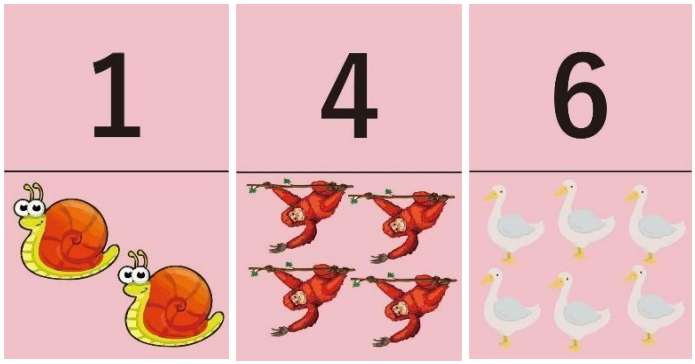
Design This development research uses the ASSURE model. The ASSURE model is a formulation model for Teaching and Learning Activities or also called a class-oriented model. In this study, the developer used the Independent T-Test Sample experimental design. The use of this design was carried out during a limited-scale trial at the Muhajirin Tandes Kindergarten in Surabaya due to COVID-19 constraints which hampered the trial process on a large scale. The population in this study were parents and children aged 4-6 years at Muhajirin Tandes Kindergarten Surabaya. In this study, researchers used a sample of 34 parents and children aged 4-6 years at the Muhajirin Tandes Kindergarten in Surabaya. The sample of this research was determined using the purposive sampling technique.

The data collection instruments used in research on the development of conventional domino media and contemporary digital domino media are quantitative data collection instruments and qualitative data instruments. Quantitative data is obtained from the calculation results and has a value limit by using a validation sheet given to media and material experts. To know how the development of conventional domino media and contemporary digital domino media as a means of developing children's logical thinking processes in matching numbers with numbers for children aged 4-6 years can meet the criteria with the aspect of acceptability. For data collection, uses a questionnaire on the effectiveness of conventional domino media and contemporary digital domino media and uses a cognitive questionnaire for children aged 4-6 years.

## III. RESULT AND DISCUSSION

The results of this study are described based on the ASSURE development steps with the following results: Analyze Learner Characteristics In children's learning, children often learn to use children's worksheets at school. According to researchers, children will get tired more easily if the activities carried out are only dominant on less interesting objects

such as children's worksheets, and it is proven that there are many complaints around them. State Objectives In this purpose the discussion above has been determined, therefore the purpose of this study has been fulfilled by the evidence of the results of a feedback survey on parents of children aged 4-6 years which proves that digital media is very effective for children's learning through fun play activities. Select, Modify, Or Design Materials In this study, researchers have chosen teaching materials by considering the benefits of using educational domino media for children's cognitive abilities. Utilize Materials In terms of media selection and media preparation, researchers choose conventional and contemporary digital educational domino media because conventional domino media is suitable for learning in schools but for contemporary domino educational media, it is highly recommended if it is used for learning outside of school. These two media have been created by researchers according to the needs of children in the survey that has been carried out. The following is a contemporary digital and conventional domino media design:




PICTURE 1. CONVENTIONAL EDUCATIONAL DOMINO MEDIA


Picture 2. Contemporary Domino Media

*Require Parents Response* In this case the researcher tries to attract parents' interest in children's learning. With the spread of games developed by researchers at this time parents also play an active role in it. Parents also become sensitive to the limits of their children's abilities. And Evolution In this evaluation, the research carried out has gone through the validation stages of material expert validation from media experts and also feedback from children's parents as evidenced by material and media validation tests, material, and media reliability tests, normality tests, homogeneous tests, and descriptive tests to see the effectiveness of educational domino media on children's cognitive.

In this study, researchers used 34 samples of parents and children aged 4-6 years at Muhajirin Tandes Kindergarten Surabaya. In this study, the first thing to do was to do a validation test on parents' perceptions and the results of children's cognitive abilities related to the ability to match numbers with numbers referring to Piaget's theory which was declared valid. The calculation of the validity test using SPSS 23 with a sig level of 0.05 with the results of r above (0.17) on each item is declared valid because r table > r count. To test the validity of parental feedback on conventional educational domino media and contemporary digital education domino media with the results of r above (0.17) for each item it is declared valid because r table > r count.

To test the reliability in this study, the researcher used the Cronbach's Alpha formula which resulted in the effectiveness of conventional domino media being 0.631, while the effectiveness of contemporary domino media was 0.516. The results of the cognitive abilities of children who use conventional media are 0.740, while the cognitive abilities of children who use contemporary media are 0.635. The following are the details of the reliability test results in tabular form:

Table 1. Reliability Test

| Variable | Cronbach Alpha | |
|---|---|---|
| | Conventional Media | Contemporary Media |
| Effectiveness of conventional and contemporary media | 0.631 | 0.516 |
| Cognitive results according to number symbols with numbers in children aged 4-6 years | 0,740 | 0,635 |

The coefficient of effectiveness of conventional domino media and contemporary domino media is above 0.6. The results of children's cognitive abilities in matching number symbols with numbers above 0.6. This study has a reliability test that is proven to be very reliable.

Further, correlation test to determine whether there is a relationship between the use of conventional domino media and digital domino media with children's cognitive development. The following are the results of the Correlation Test:

Table 3 Correlation Test

| | Sig | Person Correlation |
|---|---|---|
| **Conventional Domino Media** | 0,061 | 0,671 |
| **Digital Domino Media** | 0,031 | 0,922 |

According to the Correlation Test table above, it can be decided that the significance value is less than 0.05, so it can be concluded that all the data above are correlated or related to each other. The degree of relationship can be said to be strongly correlated because conventional domino media has a related degree of 0.671 while digital domino media has a very strong relationship with a correlation degree of 0.922. So it can be concluded that digital domino media has a very strong relationship with children's cognitive development compared to conventional domino media. After doing the Correlation Test, it will be continued by doing the Independent T Sample Test. The purpose of using the Independent

T Sample Test is to prove the difference in the effectiveness of conventional domino media and digital domino media on children's cognitive development. The following are the details in the tabular form regarding the Independent T Sample Test:

Table 4 Uji Independent T Sample

| Variable | Mean | | SD | | Sig |
|---|---|---|---|---|---|
| | Conventional Media | Contemporary Media | Conventional Media | Contemporary Media | |
| Effectiveness Media Conventional and Contemporary | | | | | |
| | 25,47 | 27,76 | 1,463 | 0,437 | .000,1 |
| Cognitive outcomes by the number symbol with the number of children aged 4-6 years | 10,59 | 11,82 | 1,004 | 0,393 | .000,1 |

In the Test table results, Independent Sample T above it can be concluded that the conventional domino media and media Digital is an effective medium for children's cognitive development. This is evidenced by the results of the significance of less than 0.05. However, in the average score, there is a difference in scores between conventional and contemporary domino media. Where the average score of contemporary media (27.76) is greater than conventional domino media (25.47). So it can be concluded that contemporary media is favored by children aged 4-6 years compared to conventional media and also has high effectiveness for use in cognitive learning.

The contribution of the results of this study lies in the effectiveness of conventional domino media and contemporary digital domino media on the ability to recognize numbers in children. The factors that influence cognitive development through this media are found in attractive and colorful media designs that have various animal objects that can stimulate children's cognition to play while learning and also material delivered directly can make children easy to understand.

## IV. CONCLUSIONS AND RECOMMENDATIONS

From the results of the study, it can be concluded that in early childhood cognitive learning, innovative and interesting media are needed for children, besides being able to improve children's cognitive abilities, it can also attract children's interest in learning while playing. In this way, children are not always only given learning through (Child Worksheets), but children also need learning media that can be used anywhere and anytime. In learning using

conventional and contemporary digital domino media, it can affect children's cognitive development in mathematical logical thinking to match number symbols with numbers.

In this study, it has been able to fulfill the suggestions from previous research conducted by Aisyah (2018) regarding the development of number cards on the ability to recognize numbers 1-5 for children aged 4-5 years, which researchers have been able to develop effectively through conventional domino media and domino media. contemporary digital for kids. In addition to developing media, the researchers also added material aimed at children aged 4-6 years. The implication of this research is on aspects of the positive benefits of digital media, where children's cognitive development is formed through the stimulation of games played by children so that gamification learning can be applied effectively in cognitive development in children. This study has limitations because this study was conducted with limited research samples on a small scale. After all, this research was conducted during the COVID-19 pandemic. For further research, it is recommended to add more material in conventional domino media and digital domino media to make children more enthusiastic to learn not only in numbers but in other matrices as well. Themes in conventional domino media and digital domino media should also be further developed because researchers only raised the theme of animals, so further research is expected to raise other themes that are by the theme of learning in Kindergarten. It is recommended for further research using longitudinal experimental research and also being able to expand on a large scale to be disseminated in several schools.

## V. ACKNOWLEDGMENTS

Special thanks are addressed to God Almighty for giving the smooth running of the research. The second speech is addressed to the Muhajirin Tandes Kindergarten Surabaya and parents of students who have provided the opportunity for researchers to conduct observations, surveys, and interviews. Thank you also to the State University of Surabaya, which is our alma mater who has supported the research, and not to forget to say thank you to Seameo Ceccep who has allowed researchers to become awarding Research Grand. Finally, thank you to all parties involved and participating in the dissemination of this research on a limited scale.

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