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The Effectiveness Of M-Puzzle Toward Preschooler Spatial Skill

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Abstrak

Penelitian ini bertujuan untuk mengetahui efektivitas permainan puzzle geometri berbasis digital untuk menstimulasi kecerdasan spasial anak usia 4-5 tahun. Jenis penelitian ini merupakan R&D (Research and Development) menggunakan model ASSURE. Penelitian ini menggunakan target partisipan anak usia 4-5 tahun di TK PGRI II Taji sebagai uji validitas instrumen, TK Dharma Wanita Duriwetan sebagai sampel utama untuk uji coba produk puzzle geometri berbasis digital dan TK Muslimat NU Hidayatul Athfal sebagai uji coba produk konvensional (LKA). Hasil penelitian menunjukkan bahwa media puzzle geometri berbasis digital yang telah dikembangkan lebih efektif digunakan sebagai media pembelajaran untuk menstimulasi kecerdasan spasial anak dalam mengenal bentuk dan warna dibandingkan dengan media konvensional.

Abstract

This study aimed to determine the effectiveness of digital-based geometry puzzle games to stimulate the spatial intelligence of children aged 4-5 years. This type of research is R&D (Research and Development) using the ASSURE model. This study used the target participants aged 4-5 years in PGRI II Taji Kindergarten as a test of instrument validity, Dharma Wanita Duriwetan Kindergarten as the main sample for testing a digital-based geometry puzzle product and NU Hidayatul Athfal Muslimat Kindergarten as a conventional product trial (LKA). The results showed that the digital-based geometric puzzle media that had been developed was more effectively used as a learning medium to stimulate children's spatial intelligence in recognizing shapes and colors compared to conventional media.

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INTRODUCTION

Basically, every child born into this world has a unique potential. Kertamuda (2015) suggests that children aged 0-8 years are in a golden age where children in this age range explore everything they want to do. In early childhood, parents and teachers are required to help develop the intelligence possessed by children. According to Rachmawati (2019) research, most children's intelligence is assessed only from the ability to read and write, the intelligence that is often ignored and lacks stimulation is visual-spatial intelligence. Therefore, children find it difficult to distinguish colors, sizes, right and left directions, and difficult to distinguish shapes. Thus, there is a need for attention and innovation of media or games as a means of stimulation to support children's spatial intelligence.

With the results of a review of 20 PG-PAUD journal articles with the identification year 2015-2020, it was found that there was a relationship between puzzle games and children's spatial intelligence. The research conducted by Senawati et al. (2016) obtained the value of t arithmetic (27.496) > t table (2.101) or sig. (0.000) < 5% (0.05) meaning that there is a very significant difference before and after the experiment by practicing the sand puzzle game. Therefore, it can be concluded that the sand puzzle game is effectively used to improve the visual-spatial intelligence of children aged 5-6 years.

Supported by research Prasetyoningrom et al. (2015), through picture puzzle media, children's visual-spatial intelligence can be improved. The results of the first cycle showed that there were 7 children or 53.85% getting a complete score and in the second cycle there were 11 children or 84.62% getting a complete score. This is reinforced by research conducted by Lin & Chen (2016) showing that effectively designed puzzle games could improve students' spatial visualization skills and mental rotation. Furthermore, the results of research by Renavitasari & Supianto (2018) showed that tangram puzzles have the potential to be used in education as a game to train spatial abilities. Following research conducted by Zulkifli (2020), the results of data analysis showed that after children play constructively their visual-spatial intelligence is in the very high category. Constructive play is a game of

creating works according to imagination with media such as lego (blocks), geometry, and puzzles.

From 5 journals that have been reviewed and described, it can be concluded that research has a high effectiveness when puzzle games are used as a method to stimulate children's spatial intelligence. The focus of this research is on children's spatial intelligence, where this intelligence is very important for children because it has benefits for children's development. According to Armstrong (2004), children who are intelligent in spatial visuals have sensitivity in seeing and distinguishing objects in more detail and accurately based on lines, shapes, colors, spaces, textures, and relationships between elements. In addition, children also have high imagination and creativity. Nopiana (2018) emphasized that when entering a higher level of education, children will be required to have an understanding of new and complex things in the environment and learning activities, such as recognizing letter shapes or geometric shapes, space and direction. Therefore, children need to be equipped with knowledge centered on direction, object perspective in shape, space, color, and size.

One of the games that is interesting and affects children's spatial intelligence is a puzzle game. Puzzle is a game consisting of pieces of boxes, pictures, shapes, letters, or numbers that are arranged into an interesting game so that this game will make children motivated and interested in participating in teaching and learning activities (Srianis et al., 2014). In a previous study conducted by Altiner (2018) with the title "Relationship between Spatial Thinking and Puzzle Games of Elementary School Students", it was found that there was a positive and significant relationship between puzzle games and students' spatial abilities.

Based on initial observations made at the Maduran District Kindergarten, more precisely in the Dharma Wanita Duriwetan Kindergarten, the implementation of spatial intelligence activities in indicators of recognizing geometric shapes and colors has been carried out but is still not running optimally. This is because children are less interested in participating in learning caused by the lack of learning media that are liked and interesting for children. In the observations that have been made, teachers tend to introduce geometry to children by doing LKA (Child

Worksheets) so that children look less enthusiastic and feel bored. For this reason, it is necessary to improve in stimulating children's spatial intelligence by using media that can be of interest to children to stimulate children's spatial intelligence.

Due to the Covid-19 outbreak, teaching and learning activities and schools are carried out online, and therefore there is a need for educational innovation by collaborating with digital technology that can facilitate children in this digital era so that learning is carried out more effectively, efficiently, interestingly, and effectively, fun for children. The goal is that children's spatial intelligence remains maximally stimulated even though learning during the pandemic is carried out remotely (online). Based on the background description and a review of previous research that has been done, the researcher raised the title "Effectiveness of M-Puzzle toward Prescholer's Spatial Skill".

In this digital-based geometry puzzle game, a conventional puzzle game into a contemporary android-based one is developed. This Geometry Puzzle Game includes material for geometry recognition, color recognition, and shape and color puzzle games with three choices of levels starting from easy, medium, and difficult. The purpose of this study is to develop a digital-based PUTRI (geometry puzzle) game, to find out the feasibility of a digital-based geometry puzzle game and to find out the results of testing the effectiveness of a digital-based geometry puzzle game to stimulate children's spatial intelligence. The urgency of this research is to implement digital-based PUTRI media (geometry puzzle) to stimulate children's spatial intelligence in Dharma Wanita Duriwetan Kindergarten. This research is expected to be able to contribute to learning carried out through distance during the Covid-19 pandemic as a medium for stimulating children's spatial intelligence.

LITERATURE REVIEW

Definition of Play

Fatmawati & Widayati (2016) explained that playing is an activity that creates pleasure in children and provides satisfaction that will affect children's development.

Tedjasaputra (2001) explains that playing is a fun activity for children and an inherent need for each child. Play is a bridge for children from informal learning to be formal. For example, when children initially play with blocks, children will learn about various geometric shapes (knowing names, recognizing shapes and learning to concentrate on completing tasks). Recognition of shapes is the basis for children to recognize letters and numbers.

Play activities are activities that are based on happiness and without seeing the end result. When activities carried out voluntarily, there is no coercion or pressure on other parties. Through play activities, children also learn with pleasure. Playing while learning is very important for children, especially early childhood because children increase the various kinds of potential that exist in children (Mutiah, 2015).

According to Fadlillah (2019), playing activities are the most effective way for children to learn new things. Through playing children will build their understanding of whatever is around them and build their creativity.

Benefits of Playing

Playing with game tools can serve as therapeutic (related to therapy). Therefore, the learning process in children should be completed and carried out through the method of playing with game tools. This is because the learning process is a process that is considered boring for children while playing is much more interesting for children. By playing children can stimulate developmental aspects ranging from cognitive, affective, social, emotional, motor, to language (Pratiwi, 2017).

The following are the benefits of playing for children according to (Yuriastien et al., 2009):

1. Understanding him/herself and developing self-esteem in children,
2. Finding things that children can do and developing their self-confidence,
3. Training the child's mentality,
4. Increasing children's creativity and freeing them from stress,
5. Developing socialization patterns and emotions in children,

6. Training motor skills and honing analytical power in children,
7. Distributing children's needs and desires,
8. Creating Moral standards,
9. Developing the right brain in children.

Puzzle Games

Puzzle is a type of modern game that can be played by arranging the pieces of the image into a unified whole so that it matches the desired image (Fadlillah, 2017).

Playing a puzzle is an activity to disassemble and then rearrange the puzzle pieces to their original shape. The initial position of the puzzle that is messy or inappropriate and out of place will make the child feel challenged so that it encourages the agility of the child's hand and mind coordination (Depdiknas, 2003).

As stated by Agustina (2012), puzzle is a game that consists of pieces of pictures or certain shapes that can hone creativity, concentration, and order in children. Puzzle games can be played by children up to the age of teens but with a level of difficulty that is adjusted to the age of the child who plays it.

It can be concluded that the puzzle is a game with the activity of disassembling and then rearranging the pieces of the picture into a complete picture. By providing puzzle games to children, they can train creativity, order, and concentration in children.

Stimulation

Stimulation is the stimulus given by the child's external environment. Stimulation is very important for the process of child development. Children who get stimulation with direction will develop faster than children who do not even get stimulation. Stimulation also has a function as a reinforcement that can be beneficial for children's development. The various kinds of stimulation provided in the form of verbal, visual, tactile, auditive, and other stimulation, can optimize children's development (Sa’adah et al., 2020).

According to Hasan (2010), stimulation will affect the growth of synapses (synaptogenesis process) and requires a lot of sialic acid to form gangliosides which are important in the speed of learning and memory processes. Stimulation carried out from an early age has a great influence on the various intelligences of children (multiple intelligence).

The benefits of providing stimulation to child development according to the Ministry of Health, 1990 in (Sa'adah et al., 2020) are:

1. Assisting children in achieving optimal levels of development,
2. Avoiding developmental delays that can cause developmental disorders,
3. Improving the ability of parents and families in creating conditions that can be beneficial for children's development.

Spatial Intelligence

Intelligence, according to the view of multiple intelligences in Gardner (2013), is defined as an ability that has three main components, namely: 1. Ability to solve problems that exist in everyday life; 2. Ability to generate new problems to solve; and 3. Ability to create something. In Santrock (2007), intelligence is defined as the ability to deal with problems, the capacity to adapt and learn from experience, characteristics such as creativity and interpersonal skills. It can be concluded that intelligence is a person's ability to think, solve problems, adapt, and learn from everyday life experiences. According to Armstrong (2004), visual-spatial intelligence or image intelligence or spatial vision intelligence is defined as the ability to perceive the visual-spatial world accurately and then transformed into various forms. Yuriastien et al., (2009) added that spatial intelligence or image intelligence is a child's ability to understand the relationship between objects and space more deeply. These children have the ability to create imaginary shapes in their minds or create 3-dimensional shapes.

Spatial intelligence has a very close relationship with aspects of cognitive development in children. Children use this intelligence to think in visuals and images to solve problems and find answers.

Children's visual spatial intelligence can be seen through indicators: a) children's ability to see and combine colors when coloring or decorating; b) enjoys doodling, drawing, and making simple designs; c) ability to understand direction; d) ability to understand shapes; and e) ability to create a form (Musfiroh, 2012).

Visual-spatial intelligence of early childhood can be developed through various ways such as playing, free drawing, painting, coloring, finger painting, field trips, imagination, storytelling, storytelling, decoration projects, and games. The methods discussed are the introduction of visual information, color recognition and integration, drawing skills development, photo-film appreciation, construction skills, visual skills sharpening and imagination development (Musfiroh, 2012).

According to Yuriastien et al., (2009), to develop spatial intelligence in children, it can be done by giving games such as lego, blocks, puzzles, or painting equipment.

RESEARCH METHODS

This research is a development research or commonly referred to as R&D (Research and development) with the aim of stimulating children's spatial intelligence in recognizing geometric shapes oriented to digital-based Geometry Puzzle game products. According to Sugiyono in (Saputro, 2017), the Research & Development method is a research method used to produce a particular product or improve existing products and test the effectiveness of the product. In the world of education and learning, development research focuses its studies on design or design in the form of models and designs of teaching materials, products such as media, and also processes (Setyosari, 2016).

Research Design in this study using the ASSURE model design. As stated by Panggabean et al. (2020), ASSURE model is a learning system design model that is easy to apply and practical to design learning activities both individual and classical.

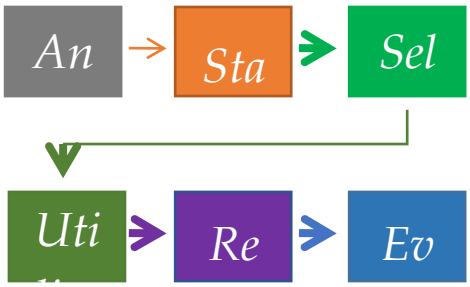

Chart 1. ASSURE Research Stages

The steps for implementing the ASSURE model according to Smaldino in (Sejati & Koeswanti, 2020) consist of 6 stages. The first stage is Analyze Learner Characteristics. At this stage, 10 children were observed consisting of 2 boys and 8 girls aged 4-5 years at Dharma Wanita Duriwetan Kindergarten. Based on the observations made, it showed that there were still many children whose spatial intelligence has not yet developed. This can be seen from the results of observations which showed that children were still confused in distinguishing geometric shapes and took a long time when asked about the color of an object. Children's willingness to recognize geometric shapes is still very low because the media used in learning is less attractive. This is because most of the learning activities carried out remotely during the Covid-19 pandemic use worksheets sent by teachers for children to work on at home.

The second stage is State Objectives. After conducting the analysis, the next stage is identifying the problems experienced by the child and determining goals that are relevant to the child's needs based on the analysis carried out in the first stage. This is done to determine what media is interesting and in accordance with the needs of children aged 4-5 years which aims to stimulate children's spatial intelligence.

The third stage is Select, Modify, or Design Materials. It is very important to use methods, media, and teaching materials to help children achieve these goals. In the selection of the chosen method is the game method as a means to stimulate children's spatial intelligence in recognizing geometric shapes, this game method is

chosen to be more interesting and children become more enthusiastic. In the selection of media, the media chosen is digital-based where the materials used are easy to find and reach by many people, be it teachers or parents by downloading game applications on their respective gadgets or tablets. In this game, it is also determined that the game does not have a bad effect on children because the PUTRI game (Geometry Puzzle) is an educational game. After selecting the media and materials, the next step is making a prototype by designing the content of the game. The following is an image of the prototype (design) of the digital-based PUTRI (Geometry Puzzle) game:

Opener and menu selection

The opener in the PUTRI game (Geometry Puzzle) has a function as a menu selection in game applications that can be selected by children consisting of a material menu, instructions, and start.

Image 1. Opener and Menu Selection

Theory

This material menu contains a choice of material that contains a video introduction to geometric shapes and a choice of color recognition material that contains a video introduction of primary and secondary colors. This material menu aims to clarify the concept of geometric shapes and colors in children.

Image 2. Geometric Shape Material

Game Instruction

This guide menu contains the objectives of the PUTRI game (Geometry Puzzle), how to play, the levels in the PUTRI game (Geometry Puzzle), and the last reward that the child will get**.**

Picture 3. Game Instruction

Start

The start menu contains a selection of games that children can choose to play. The games available in this geometry puzzle are shape puzzles and color puzzles.

Game 4. Game selection

After selecting the game to be played, a level selection menu will appear which is divided into 3 including easy, medium, and difficult levels.

Image 5. Game levels

Game Core

In this section, we have entered the geometry puzzle game. This geometry puzzle game is divided into geometric shape puzzle and color puzzle. The geometric shape puzzle has 3 levels and each level has 3 themes, namely the theme of animals, plants, and vehicles. At level 1 (easy), it consists of 3 pieces of puzzle pieces; at level 2 (medium), it consists of 5 pieces of puzzle pieces; and at level 3 (difficult), it consists of 6 pieces of geometric puzzle pieces that form a pattern.

Image 6. Easy Level

Image 7. Medium level

Image 8. Hard Level

In color puzzle, there are also 3 levels and each level has 3 themes, namely animals, fruits, and my needs. Level 1 (easy) consists of 6 images with 2 different colors and will be classified based on the same color. Level 2 (medium) comprises 6 colors consisting of primary colors and secondary colors and then the child will put the picture according to the color listed in the box. Then, level 3 (difficult) consists of 6 images that will be arranged according to the ABC-ABC color pattern as in the example.

Image 9. Easy Level

Image 10. Medium Level

Image 11. Hard Level

Worksheet & Evaluation

In this section, there is a worksheet to find out how much children understand about geometric shapes and colors. Then, there is a display of rewards in the form of praise for children, grades, and recommendations for parents and teachers.

Image 12.Worksheet

Image 13. Evaluation

The fourth stage is Utilize Technology, Media, and Materials. In terms of utilizing media and materials, using digital-based geometry puzzle media as a medium can stimulate children's spatial intelligence. Digital-based geometry puzzle game media is suitable for learning outside of school and inside school. Therefore, this media will really help teachers and parents to be able to stimulate children's spatial intelligence in online learning during the Covid-19 pandemic.

The fifth stage is Require Parents Response. At this stage, the researchers tested the validity of the material and media conducted by PG-PAUD lecturers at the State University of Surabaya who were experts in the field of PAUD and teachers with S1 PG-PAUD qualifications and had direct contact with children to determine the feasibility of learning media products that had been developed and designed. In order to try to attract the interest of teachers and parents in children's learning, a digital-based PUTRI (Geometry Puzzle) game has been designed and developed. Furthermore, a questionnaire was distributed in the form of a google form to determine the effectiveness of the product to stimulate children's spatial intelligence. The questionnaires were distributed to 3 different schools with the same criteria, namely using conventional learning such as LKA and question and answer as well as implementing distance learning. The distribution of the questionnaire was carried out at PGRI II Taji Kindergarten with the aim of obtaining instrument validity, distributing questionnaires at NU Hidayatul Athfal Muslim Kindergarten to test conventional products and distributing questionnaires at Dharma Wanita Duriwetan Kindergarten with the aim of testing digital products to determine the effectiveness of the use of PUTRI (Geometry Puzzle) games to stimulate children's spatial intelligence.

The last stage is Evaluate and Revise. At this stage, the material and media questionnaires have gone through the validation stage by material and media experts by PG-PAUD lecturers, Faculty of Education, Surabaya State University and also feedback from parents. This is evidenced through material and media validation tests, material and media reliability tests, classical assumption tests, and descriptive tests to determine the effectiveness of digital-based PUTRI (Puzzle Geometry) games in stimulating children's spatial intelligence and what needs to be improved and revised for media products that has been developed.

The target participants or respondents in this study are children aged 4-5 years in Maduran District, Lamongan Regency. Because the teaching and learning process during the Covid-19 pandemic was carried out at home, it was parents who evaluated their children's spatial intelligence in recognizing geometric shapes. The mechanism in this research is by distributing download links for educational puzzle games that have been developed to parents of children through a formal appeal letter from the school along with a google form link containing instructions for filling out and a list of statements that will be filled out by respondents. The media that will be tested and the questionnaire created will be validated by material experts and media experts and test reliability first. After revisions are made based on input and suggestions from the two experts, the product will then be tested on parents to get feedback/assessment from their respective perceptions. The Kindergartens used as the target participants and test instruments are Dharma Wanita Duriwetan Kindergarten and Muslimat NU Hidayatul Athfal Maduran Kindergarten as the main sample kindergartens that apply conventional learning using LKA (Child Worksheet) and questions and answers. In addition, PGRI II Taji Kindergarten is also a kindergarten where the validity of the instrument will be tested using the same learning method.

Data Analysis Techniques in the study were divided into two, namely: (1) Prior to the empirical test, the validity and reliability tests were carried out on the questionnaire question items. Analysis of the data used in this study is Pearson correlation or product moment in order to determine the level of validity of the question items and determine whether the question items are suitable for use or not.

Then, the reliability test was carried out using the Cronbach's alpha formula which was used to determine the level of reliability of the research instrument. (2) After testing the validity and reliability of the instrument, descriptive statistical analysis is then carried out by clarifying the mean (mean) on spatial intelligence. This stage aims to get a picture of children's spatial intelligence in recognizing geometric shapes and to determine the effectiveness of the media to stimulate children's spatial intelligence. These two stages aim to get an overview of spatial intelligence in children. Besides, the instrument to test the feasibility of the digital-based PUTRI games media (Puzzle Geometry) was carried out through only 1 stage, namely a feasibility test on material experts and media experts.

RESULT AND DISCUSSION

According to the stages of the ASSURE development model (Analyze learner characteristics, State objectives, Select, modify or design, materials, Utilize technology, media and materials, Require parents response, Evaluate and revise), development of digital-based geometry puzzle games stimulates the spatial intelligence of children aged 4-5 years. The first stage of the development process for the digital-based geometry puzzle game is to analyze the problems that exist in the school first. One of the problems found in the field is regarding children's spatial intelligence, especially in recognizing shapes and colors. Based on the analysis and findings, the researchers then looked for solutions to problems that have been found in the field. The solution given is to use digital-based educational media that is designed to stimulate children's spatial intelligence. The media chosen was a digital-based geometry puzzle game. The media was chosen because the materials used are easy to find and reach by many people, be it teachers or parents by downloading game applications on their respective gadgets or tablets. In addition, digital-based media can also be practiced both inside and outside the classroom, making it suitable for online distance learning during a pandemic like today.

The feasibility of this digital-based geometric puzzle game media is proven by the validity test of material experts and media experts conducted by PG-PAUD lecturers, State University of Surabaya. In the test of the validity of the material

experts in the digital-based geometry puzzle game, the mean value of 3.8 is close to a score of 4 which indicates a range of 76-100, which means that the feasibility of the material in the digital-based geometry puzzle game is declared to be very effective. Furthermore, to test the validity of media experts in digital-based geometry puzzle games, the mean value of 3.3 is close to a score of 3 which indicates a range of 51-75, which means that the feasibility of media in digital-based geometry puzzle games is declared effective. From the results of the validity tests that have been carried out by material experts and media experts, it can be concluded that the digital-based geometric puzzle game media is feasible to be tested on children.

In addition to conducting validation tests on material experts and media experts, a questionnaire was distributed using a google form to Early Childhood Education teachers who had the educational qualifications of S-1 PG PAUD as support for validation of material experts and media experts. Based on the results of the descriptive test of the material and media on the geometry puzzle game conducted by the teacher, it can be concluded that the presentation item has a mean value of 3.62 approaching a score of 4, which means that 76-100 respondents stated that the level of presentation in the digital-based geometry puzzle game media is very effective. Furthermore, for material items, the mean value was 3.87, close to a score of 4, which means that 76-100 respondents stated that the level of material in digital-based geometry puzzle game media is very effective. Then, for the item effectiveness 3.50, it is close to a score of 3, which means 57-75 respondents stated that the level of effectiveness in the digital-based geometry puzzle game media is effective.

The results of the validity test on each item of parental perception questions related to children's spatial intelligence in recognizing shapes and colors in children aged 4-5 years. The question items provided were declared valid and no question items were dropped. The calculation of the validity test was carried out using IBM SPSS 25 with a significance level of 0.05 with the results of r-count above (0.514) on each question item, meaning that the value of $r_{count} > r_{table}$ so that the data obtained on each question item was declared valid.

Furthermore, the reliability test in this study used the Cronbach's Alpha formula obtained from the questionnaire of parents' perceptions of children's spatial intelligence. This calculation resulted in a value of (0.852) on the questionnaire of parents' perceptions of children's spatial intelligence in recognizing shapes and colors and (0.853) on the usage questionnair, geometry puzzle game media which shows that the coefficient value of Cronbach's Alpha spatial intelligence and digital-based geometry puzzle game media is above 0.6. The reliability results were between 0.80 – 1.00 and the questionnaire was proven to be highly reliable.

After testing the validity and reliability which was declared valid and reliable, then the Classic Assumption Test was carried out consisting of the Normality Test and Homogeneity Test. The following is a table of the Classical Assumption Test:

Table 1. Classical Assumption Test

	Normality (Saphiro Wilk)	Homogeneity
X1	0.600	0.917
X2	0.669	0.370

(Source: SPSS 25 data output)
X1 : Digital Geometry Puzzle Media
X2 : Conventional Media

Based on the Normality Test in the table above, it shows that the Normality Test carried out by Saphiro Wilk obtained a sig value. of (0.600) on a digital-based geometry puzzle game and (0.669) on conventional media or LKA. This shows that the value of sig.>α so that the data is normally distributed. Then, the homogeneity test results show that the sig. based on the mean for digital media variables is (0.917) and for conventional media variables (0.370). Because the value of both sig.> 0.05, it can be concluded that the data has the same variance (homogeneous).

After doing the Classical Assumption Test, and then an analysis of the media feedback given to parents in the form of a questionnaire via google form was carried out using descriptive statistical analysis to determine the effectiveness of the digital-based geometry puzzle game to stimulate the spatial intelligence of children aged 4-5 years. Items used include accuracy, accuracy and understanding of form. The rubrics used in the Descriptive Statistical Analysis are as follows:

Table 2. Assessment Rubric

Skor	Range	Description
1	0 – 10	Undeveloped
2	11 – 20	Starting to Grow
3	21 – 30	Growing as Expected
4	31 – 40	Very Well Development

From these data, the results of the Descriptive Statistics test are obtained according to the following table:

Table 3. Descriptive Test Results

	Geometry Puzzle Digital Based			Conventional Media (LKA)		
	Mean	Std. Deviation	Skor Keefektivan	Mean	Std. Deviation	Skor Keefektivan
Precision	3.68	0,.6	4	2.91	0.53	3
Accuracy	3.25	0.43	3	2.56	0.59	3
Understanding Shapes	3.30	0.46	3	2.43	0.56	2

(Source: SPSS 25 data output)

Based on the table above, it shows that the results of feedback from parents on children's spatial intelligence in recognizing shapes carried out by filling out online surveys via Google Forms get descriptive test results as follows:

1. Precision Item

   The precision item on digital-based geometry puzzle media (PUTRI) shows a mean value of 3.68, close to a score of 4 which indicates a range of 31-40, meaning that the precision item on children's spatial intelligence on geometric puzzle media develops very well. Meanwhile, in conventional media using LKA, the precision item shows the mean (2.91) close to 3 which indicates a range of 21-30, meaning that the precision item on children's spatial intelligence using conventional media develops as expected.

2. Accuracy

   The accuracy item on digital-based geometry puzzle media (PUTRI) shows a mean value of 3.25, close to a score of 3 which indicates a range of 21-30, meaning that the accuracy item on children's spatial intelligence on geometric puzzle media develops as expected. Meanwhile, in conventional media using LKA, the accuracy item shows the mean value (2.56) close to 3 which indicates

a range of 21-30, meaning that the accuracy item on children's spatial intelligence using conventional media develops as expected.

3. Understanding of Shapes

   The item understanding of shapes on digital-based geometry puzzle media (PUTRI) shows a mean value of 3.30, close to a score of 3 which indicates a range of 21-30, meaning that the accuracy item on children's spatial intelligence on geometric puzzle media develops as expected. Meanwhile, in conventional media using LKA, the accuracy item shows a mean value of 2.43 approaching number 2 which shows a range of 11-20, meaning that the item understanding of shapes on children's spatial intelligence using conventional media begins to develop.

After the Classical Assumption Test and Descriptive Analysis on the media and feedback from parents on the child's spatial intelligence in recognizing shapes and colors were carried out, and then Regression Analysis was carried out which was used to determine the effect of the variables. In this study, digital-based geometric puzzle media was used as a treatment group variable and conventional media (LKA) as a control group. The following are the results of multiple regression analysis calculations:

Table 4. Regression Test

	Regression Coefficient	**T_{count}**	**Sig.**
Constant	13.509		
X_1	.619	2.470	.029
X_2	.059	.286	.780

(Source: SPSS 25 data output)
T_{table} = 2.179
Y : Children's Spatial Intelligence
X_1 : Digital Geometry Puzzle Media
X_2 : Conventional Media

According to Pasaribu (2020), if the significance value is greater than the probability value of 0.05 (sig. arithmetic > 0.05), it can be concluded that the independent variable (free) does not have a significant effect on the dependent variable (bound), or it can be said H_o accepted and H_1 rejected. If the significance

value is less than 0.05 (sig. arithmetic <0.05), it can be concluded that the independent variable has an influence on the dependent variable, or it can be said that H_o is rejected and H_1 is accepted. If seen from the table above shows that the significance value of X1 (digital media) is 0.029 < 0.05, then H_1 is acceptable. It can be interpreted that there is an influence of digital-based geometric puzzle media (PUTRI) on children's spatial intelligence in recognizing shapes and colors in children aged 4-5 years. While the significance value on X_2 (conventional media) is 0.780 > 0.05, it can be concluded that H_2 is not rejected, which means that there is no effect of conventional media using LKA on children's spatial intelligence. Thus, it can be concluded that digital-based geometry puzzle media has an effect on children's spatial intelligence.

This result is supported by Jasmine (2012) statement that people with spatial intelligence tend to think in pictures or with pictures so that it is easier to learn by using visual media such as pictures, videos, films and presentations that use models and slide shows. Stimulation that can be used to improve spatial intelligence is to often practice constructive games such as playing lego, puzzles, blocks, playing geometry and playing plasticine.

CONCLUSION

Giving stimulation to children's spatial intelligence requires interesting and innovative media so that children are enthusiastic in learning. From the data obtained, it can be concluded that digital-based geometric puzzle media is more effectively used as a learning medium to stimulate children's spatial intelligence in recognizing shapes and colors compared to conventional media. The results of the regression test show that the significance value of the X_1 variable (digital media) is below 0.05 with a significance value of 0.029 indicating that there is an influence of digital-based geometry puzzle media on children's spatial intelligence. The X_2 variable (conventional media) has a significance value of 0.780 > 0.05, meaning that there is no influence of conventional media on children's spatial intelligence. The implication of this research is the selection of appropriate learning media and has an influence on children's learning motivation and spatial intelligence. This

digital geometry puzzle media is suitable to be used as a learning support to stimulate children's spatial intelligence while at school or outside of school in remote learning (PJJ) during the current Covid-19 pandemic.

REFERENCES

Agustina, S. (2012). *Permainan Asyik Bikin Pintar*. Yogyakarta: In Azna Books.

Altiner, E. Ç. (2018). Relationship between Spatial Thinking and Puzzle Games of Elementary. *International Online Journal of Educational Sciences*, *10*(1), 75–87. https://doi.org/https://doi.org/10.15345/iojes.2018.01.008

Armstrong, T. (2004). *Sekolah Para Juara* (R. S. Marzuki (ed.)). Bandung: Kaifa.

Depdiknas. (2003). *Undang-Undang RI Nomor 20 Tahun 2003, tentang Sistem Pendidikan Nasional*.

Fadlillah, M. (2017). *Bermain dan Permainan*. Jakarta: Kencana.

Fadlillah, M. (2019). *Buku Ajar Bermain & Permainan Anak Usia Dini*. Jakarta: Prenada Media.

Fatmawati, R., & Widayati, S. (2016). Meningkatkan Kemampuan Mengenal Warna Melalui Permainan Balon Pada Anak Kelompok Bermain. *PAUD Teratai*, *5*(3), 109–113.

Gardner, H. (2013). *Multiple Intelligences: Memaksimalkan Potensi & Kecerdasan Individu Dari Masa Kanak-Kanak Hingga Dewasa. Terjemahan: Yelvi Andri Zaimur*. Jakarta: Daras Books.

Hasan, M. (2010). *Pendidikan Anak Usia Dini*. Jogjakarta: Diva Press.

Jasmine, J. (2012). *Metode Mengajar: Multiple Intelligences*. Bandung: Nuansa Cendekia.

Kertamuda, M. A. (2015). *Golden Age - Strategi Sukses membentuk Karakter Emas pada Anak*. Jakarta: Elex Media Komputindo.

Lin, C. H., & Chen, C. M. (2016). Developing spatial visualization and mental rotation with a digital puzzle game at primary school level. *Computers in Human Behavior*, *57*, 23–30. https://doi.org/10.1016/j.chb.2015.12.026

Musfiroh, T. (2012). *Pengembangan Kecerdasan Majemuk*. Tangerang: Universitas Terbuka.

Mutiah, D. (2015). *Psikologi Bermain Anak Usia Dini*. Jakarta: Kencana.

Nopiana, Nurfarida, I., & Suryadi. (2020). Peningkatan Spatial Visual Intelligence Melalui Kegiatan Bermain Engklek. *Jurnal Tunas Cendekia*, *3*(2), 139–150. https://doi.org/https://doi.org/10.24256/tunas%20cendekia.v3i2.1293

Panggabean, N. H., Danis, A., & Simarmata, J. (2020). *Desain Pengembangan Bahan Ajar Berbasis Sains*. Medan: Yayasan Kita Menulis.

Pasaribu, E. Z., Rahmi, S. Y. R., Ritonga, M. W., Watrianthos, Ritonga, W. A. R., Rangkuti, R. K., & Harahap, N. (2020). *Belajar Statistika: Siapa Takut Dengan SPSS* (p. 66). Medan: Yayasan Kita Menulis.

Prasetyoningrom, W., Sutijan, & Shaifuddin, M. (2015). *Meningkatkan Kecerdasan Visual Spasial Pada Tema Pekerjaan Melalui Media Puzzle Gambar (Penelitian Tindakan Kelompok Anak Kelompok B2 Tk Pertiwi 02 Jenengan, Boyolali Tahun Ajaran 2013/2014)*. *2*(5).

Pratiwi, W. (2017). Konsep Bermain Pada Anak Usia Dini. *Manajemen Pendidikan Islam*, *5*(2), 106–117.

Rachmawati, Y. (2019). Hubungan antara Kegiatan Bermain Maze dengan Kecerdasan Visual-Spasial Anak Usia Dini. *(JAPRA) Jurnal Pendidikan Raudhatul Athfal (JAPRA)*, *2*(2), 74–82. https://doi.org/10.15575/japra.v2i2.9731

Renavitasari, I. R. D., & Afif Supianto, A. (2018). Educational Game for Training Spatial Ability Using Tangram Puzzle. *3rd International Conference on Sustainable Information Engineering and Technology, SIET 2018 - Proceedings*, 174–179. https://doi.org/10.1109/SIET.2018.8693164

Sa'adah, N., Suparji, & Sulikah. (2020). *Stimulasi Perkembangan Oleh Ibu Melalui Bermain Dan Rekreasi Pada Anak Usia Dini*. Surabaya: Scopindo Media Pustaka.

Santrock, J. W. (2007). *Perkembangan Anak, ed. Ke-11 . Terjemahan: Rachmawati, M dan Anna Kuswanti*. Jakarta: Salemba Humanika.

Saputro, B. (2017). *Manajemen Penelitian Pengembangan (Research & Development) Bagi Penyusun Tesis dan Disertasi*. Yogyakarta: Aswaja Presindo.

Sejati, K. A. P., & Koeswanti, H. D. (2020). Pengembangan Model Media Pembelajaran Berbasis PC Game Untuk Meningkatkan Kemampuan Pemecahan Masalah Materi Bangun Datar. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *4*(2), 602–614. https://doi.org/10.31004/cendekia.v4i2.279

Senawati, R. M., Indarto, W., & Chairilsyah, D. (2016). *The Influence Of The Game A Puzzle Sand To Visual Spasial Intelligence Of 5-6 Yeard Old Children At Tk Education 21 Kulim Subdistrict Pekanbaru Pengaruh Permainan Puzzle Pasir Terhadap Kecerdasan Visual Spasial Pada Anak Usia 5-6 Tahun Di Tk Education 21*. *3*(2), 1–15.

Setyosari, P. (2016). *Metode Penelitian Pendidikan & Pengembangan*. Jakarta: Prenada Media.

Srianis, K., Suami, N. K., & Ujianti, P. R. (2014). Penerapan Metode Bermain Puzzle Geometri Untuk Meningkatkan Perkembangan Kognitif Anak Dalam Mengenal Bentuk. *E-Journal PG-PAUD*, *2*(1), 1–11. https://ejournal.undiksha.ac.id/index.php/JJPAUD/article/view/3533

Tedjasaputra, M. S. (2001). *Bermain, Mainan dan Permainan*. Jakarta: Gramedia Widiasarana Indonesia.

Yuriastien, E., Prawitasari, D., & Febry, A. B. (2009). *Games Therapy Untuk Kecerdasan Bayi & Balita*. Jakarta: Wahyu Media.

Zulkifli, T. I. (2020). Pengaruh Bermain Konstruktif Terhadap Kecerdasan Visual Spasial Anak Di Tk Islam Terpadu Nurul Fikri Makassar. *TEMATIK: Jurnal Pemikiran Dan Penelitian Pendidikan Anak Usia Dini*, *6*(1), 1. https://doi.org/10.26858/tematik.v6i1.13042