Stimulating the Young Learner's Visual- Spatial Intelligence Through Geomaze

Wulan Patria Sarainsong[1], Brwa Aziz Sidiq[2] and Aprilia Mardiani Dita [3]

[1, 3] Department of Early Childhood Education, Universitas Negeri Surabaya

[2] Department of English, College of Languages, University of Human Development, Sulaimani, Kurdistan Region – F.R. Iraq

Abstract—**The urgency of this research is to implement application-based Geomaze game media at Dharma Wanita Persatuan 1 Kindergarten in Gresik Regency. This study aims to determine the development, feasibility and effectiveness of application-based Geomaze game media in stimulating visual-spatial intelligence of children aged 4-5 years. This research uses the type of research development or R&D with the ASSURE model. This study uses the target participants of children aged 4-5 years in TK Dharma Wanita Persatuan 1 Gresik Regency as the main sample for testing the application-based Geomaze game media and also testing conventional products or LKA, children aged 4-5 years in Kusuma Bangsa Kindergarten as instrument validity test. The results showed that the application-based game media Geomaze was more effective than conventional media or LKA in stimulating visual-spatial intelligence of children aged 4-5 years. This study is expected to be able to contribute to stimulating children's visual-spatial intelligence and learning media during the current Covid-19 pandemic.**

Index Terms—**spatial visual intelligence, maze, geometry, application-based.**

I. INTRODUCTION

Early childhood is the initial stage of children in the process of growth and development to become mature in life later. Providing education from an early age is expected to improve the growth and development of children in developing their abilities. Hardianto et al., (2018) argues that the quality of children's growth and development in the future is determined by the stimulation children get from an early age, because 80% of brain growth occurs at that time. Supported by research Asmiarti & Winangun (2018), this time almost all children experience a sensitive period to grow and develop rapidly and extraordinarily. Based on observations made by (Pradenastiti, 2019),to group B children at PGRI Bumirejo 2 Kindergarten, the visual-spatial intelligence of children has not shown any development. Based on the results of the initial trial and observations made by researchers on 15 children, 11 children have visual-spatial intelligence in recognizing shapes,

and the right-left direction has not developed optimally. For this reason, it is necessary to provide stimulation to improve visual-spatial intelligence in children. Thus, it is necessary to provide stimulations to improve visual-spatial intelligence in children.

With the results of a review of 20 journal articles and PAUD (Pendidikan Anak Usia Dini, or Early Childhood Education) theses, it can be concluded that there is a relation and influence of the maze game on children's visual spatial abilities. Rosidah (2014) argued that the modified maze games can improve children's visual-spatial intelligence. The increase in the first cycle with the value of children's spatial was as much as 77.7%. Then in the second cycle there was an increase in the average visual and spatial intelligence of children by 84.89%.

In another study by Ramadani (2018), the increase in children's visual intelligence is caused by the maze game. This is based on the results of the increased visual intelligence value that achieved the average target of 80%. The research conducted by Rachmawati (2019) he explained that Maze Playing Activities with Early Childhood Visual-Spatial Intelligence had a significant positive relationship due to playing a maze game on the improvement of children's visual-spatial intelligence. This is evidenced by the 25 child respondents who calculated the Statistical Package for the Social Science (SPPS) correlation coefficient with a score of 0.600 – 0.799, which means that there is a strong relationship between Maze Playing activities and Visual-Spatial Intelligence.

Related to research on visual spatial abilities in early childhood Wahyuni (2017) shows that in RA Sabariyah, Harjosari II Sub-district, Medan Amplas District, the 2015/2017 academic year, children's visual-spatial intelligence increases in each cycle due to using the maze game media.

From the 4 journals described above, it can be concluded that using maze game media is effective as a method to stimulate children's visual-spatial intelligence. This study

focuses on the development of game tools for optimizing children's visual-spatial abilities, which are quite important in children's growth and development. In the current pandemic era, when students are required to participate in online learning, it is difficult for teachers to monitor developments or problems with children's visual-spatial development.

Sujiono & Sujiono (2010) explain that in early childhood a stimulus is given to the 5 senses that are useful for developing children's intelligence. (Fathonah et al., 2020) One part of children's intelligence is visual-spatial intelligence. According to Musfiroh (2009) in (Wahyuni & Pusari, 2015) visual-spatial ability can be defined in three key words, namely: 1) Perception; capturing and understanding something through the five senses. 2) Visual spatial; namely the ability of the five senses of sight or eyes, especially on color and space. 3) Transforming; moving the shape of what is visible to the eye into another form or thing. The opinion of Martini Jamaris (2017) in (Pa'indu et al., 2020) expressed that spatial-visual intelligence involves sensitivity into colour, line, shape, size, area, and the relationship between these elements. Armstrong in (Hakim, 2017) argues that visual-spatial intelligence is the ability to visualize images in the mind. Visual-spatial intelligence is used by children in thinking that the form of visualization or images is useful in solving problems or finding answers to a question (Winnuly & Laksimiwati, 2013). Thus, children's visual-spatial intelligence is intelligence possessed by children who show the ability to think or show sensitivity in the form of images in terms of colour, shape, size, space and also the relationship between these elements.

Gunawan (2003) in (Prasusilantari, 2019) states that the characteristics of well-developed visual-spatial intelligence are: 1) Seeing; is used as a learning activity. 2) Ability to find a way out. 3) Remembering and thinking by paying attention to pictures 4) The use of graphs, maps, diagrams, or other visual aids. 5) The desire to doodle, draw, paint, and make sculptures. 6) Linking activitis that include compiling or building three-dimensional games and changing shapes into an object. 7) The ability to have a good imagination. Visual-spatial intelligence is one aspect of cognitive development. In children's visual-spatial intelligence, it is necessary to have an understanding of the concept of direction perspective (left-right), geometric shapes, and spatial concepts (Yuliana et al., 2016).

Gardner in Pradenastiti (2019), spelled out that the ability of children's visual-spatial intelligence at the age of 4-5 years, namely the imagination of children at this age starts to develop. Many games can help children to recognize the various shapes, numbers, sizes, balances and differences. At this age, the child's ability to imagine can be translated into a more structured form, which means it is not random. Children aged 4 years in general, already know the spatial two-way binary (pairs) such as the front-back direction, up-down, here and there, although the child still does not understand the right and left directions. (Apriani, 2013). From theis description, it can be said that visual-spatial intelligence is an intelligence that is usually associated with graphics, colors, and images as well as a combination of them.

Various ways or methods are used to stimulate children's visual spatial intelligence, one of the examples is playing Maze. This Maze game has the ability to train children's visual-spatial intelligence as Subagio et al's in (Wulandari et al., 2018) mentioned that maze is a puzzle game wherein the players have entere the door, and then they must find a way out to end the game.

From the aforementioned, it can be inferred the maze is a game in the form of a maze or a tortuous path with the aim of solving simple problems through the instructions provided for a way out. Maze can be integrated with learning geometry and colour into child's learning process to simplify and identify the characteristics of geometric shapes. According to Lestari (2016) the introduction of geometric shapes in early childhood can be done by introducing, pointing, naming and collecting objects based on geometric shapes. Quroisin (2015) argues that lessons on geometric shapes can be combined with other learning activities in each theme or integrated learning. One example is combining the introduction of geometry with a variety of colors. In addition to introducing geometric shapes at the age of 4-5 the introduction of color is also important, its aims is for children to be able to distinguish and know the types of basic and complementary colors (Hernia, 2013). The ability to recognize colors in children can be done by classifying objects based on color and vice versa.

In a previous study of Wahyuni (2017) the visual spatial of children in RA Sabariyah, Harjosari II Subdistrict, Medan Amplas Subdistrict, in the 2015/2017 academic year was very low with an average percentage of 26.5%. After playing mazes, children's visual spatial increases by an average percentage of 41% in cycle, in cycle 2 the average percentage result is 57.5% and in cycle 3 the average is 85%. Hence, it can be assumed that children's visual-spatial intelligence can be improved through Maze games. From observations made on children aged 4-5 years at Dharma Wanita Persatuan Gresik Kindergarten, it can be concluded that children have problems with visual-spatial intelligence in terms of recognizing geometric shapes and colors. One of the contributing factors is the current state of the Covid-19 pandemic which can make children less interested and not focused on the learning provided by online teachers. In this situation there is a need for innovation and development in learning. One of them is by making interesting learning media. The media must support online learning so that children's intelligence remains stimulated, especially their visual-spatial intelligence.

Therefore, the researcher raised the title "Development of Application-Based Geomaze Game to Stimulate Visual Spatial Intelligence of Children aged 4-5 Years". This maze game is designed in the form of an application to support online learning during the current pandemic. The purpose of this study is to determine the process of developing application-based Geomaze media and to determine the results of the effectiveness of this media as well as to determine the results of the validity of the instruments used. The urgency in this research is to implement application-based Geomaze media at Dharma Wanita Persatuan Gresik Kindergarten. This research is expected to be able to contribute to optimizing the visual-spatial abilities of children aged 4-5 years and developing learning media during the current COVID-19 pandemic which requires children to learn online.

II. METHODS

A. Research Designs

In this study, the type of research is Research and Development (R&D). According to Richey quoted by Sani, et al (2018) in (Soraya & Hasmalena, 2019) Research and Development is research that is carried out systematically with steps of designing, innovating products and evaluating products with criteria of effectiveness and internal consistency. This study uses the ASSURE model of R&D research
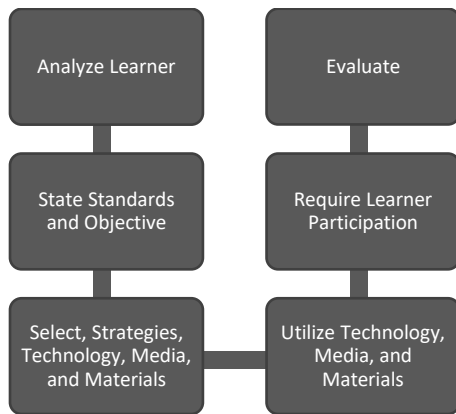

Figure 1. ASSURE Model

1) Analyze Learner

Researchers at this stage carry out an analysis to determine the background needs of a developed learning design. Researchers identified children aged 4-5 years at Dharma Wanita Persatuan Gresik Kindergarten. According the results of the analysis, it can be concluded that children are still confused in mentioning the names of flat shapes, namely rectangles, triangles, and circles. Lack of learning provided by teachers and parents can be one of the factors. Online learning during the Covid-19 pandemic was felt to be less effective in delivering learning and also evaluating children by teachers.

2) State Standards and Objectives

After conducting an analysis, the next step is to identify the problems experienced by children based on the needs analysis that has been carried out at an early stage. Thus researchers can determine what media is suitable for the needs of children aged 4-5 years. The media certainly aim to optimize the visual-spatial ability of children aged 4-5 years.

3) Select, Strategies, Technology, Media, and Materials

After identifying the needs and problems experienced by the children, the next stage is to select the strategy used, namely using game media as a means of optimizing children's visual-spatial intelligence. Application-based game media is chosen by researchers on the grounds that they can be reached by the wider community and are easier to carry anywhere because they can be downloaded via cellphones/gadgets. Next is to determine the appropriate material, and to think about the benefits of using game media for children's visual-spatial abilities. After that, one can make a prototype by designing the

content of the game that can optimize children's visual-spatial intelligence and design feasibility instruments. The following is an image of the prototype / design of the geomaze game:
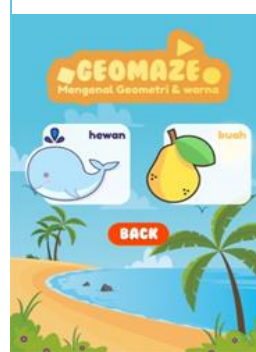

Figure 2

Figure 1

Figure 3

Figure 4

Figure 5

Figure 6

Figure 7

Figure 8

Figure 9

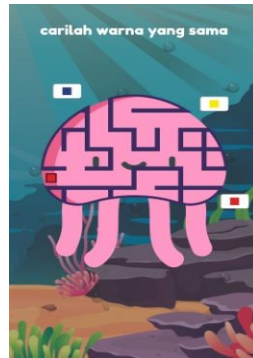**Figure 10**

Figure 12

Figure 11

Figure 1 explains the Geomaze game cover. This cover will show the name of the maze game that will be played by the children. In this section there is an option to play or exit the game. When the new game is opened there will be songs throughout the game so that children don't feel bored while playing. Figure 2 is about color recognition; children will be introduced to various basic colors, namely red, yellow and blue after the introduction of basic colors. Figure 3 explains that the children will be introduced to various simple geometric shapes and their names, including rectangles, triangles, and circles in figure 4 there will be a description of the indicators of the game that will be played by the children. And then, in Figure 5 the children will choose the theme of the maze game to be played. There are two choices of themes, namely the animal theme with a whale-shaped maze and a fruit theme with a pear-shaped maze. The other figures, 7-11, provide an explanation about the levels of the Geomaze game that will be played by children, which consists of three levels and different images on each theme. Figure 12 contains rewards for children who have played to the end. This reward contains praise so the children feel happy and enthusiastic after playing the game. This reward appears when the child has played 3 levels in each theme. There is an option to exit the game or return to choose a different theme.

4) Utilize Technology, Media, and Materials

In selecting media, researchers used application-based game media on the grounds that children would be more interested in games on gadgets and these were suitable for learning during the Covid-19 pandemic which could help children recognize flat shapes or geometry. This media is designed based on an application that is considered to be able to attract children's attention as a medium for learning at home. Children will also increase their learning experience with geomaze games that can develop children's visual-spatial intelligence.

5) Require Learner Participation

In this case the researchers tried to attract the interest of teachers in the development of children's learning. The method used is the distribution of the application-based color geometry maze game developed by the current researcher. Then the distribution of a questionnaire in the form of a Google form is useful to determine the feasibility and effectiveness of using application-based color geometry maze media. The questionnaire is filled out by teachers with a minimum standard of S1.

6) Evaluate

In this stage, the researcher has gone through the validation stage by material experts and media experts by PG PAUD Lecturers, Faculty of Education, State University of Surabaya and feedback from teachers. By going through the material and media reliability test, normality test, homogeneity test and descriptive test for the effectiveness of application-based color geometry maze media.

B. Research Sample

The target participants or respondents are children, to get an idea of their visual-spatial intelligence. Due to the limitations during the COVID-19 pandemic, it is parents who will evaluate the visual-spatial abilities of their children. For the mechanisms, the maze media that has been developed based on that the application will be shared with parents through a formal appeal letter from the school concerned. In addition, an online questionnaire via a google form will be attached to the appeal letter. The questionnaire items will go through a validity test, and a reliability test first.

The Kindergarten that will be used as the target of participants and testing the instrument is Dharma Wanita Persatuan Gresik Kindergarten as a kindergarten targeting the main sample with a minimum school criteria of B accredited, implementing Curriculum-13 learning, and still applying conventional learning such as question and answer and LKA. In addition, the Kusuma Bangsa Gresik Kindergarten is where the validity of the instrument will be tested with the same school criteria.

C. Research Instruments and Procedures

This development research collects data using research instruments in the form of: Questionnaire sheets for material and media validation by experts and observation sheets. Validation questionnaire sheets were given to material experts and media experts to determine the effectiveness of application-based color geometry maze media as learning media that can optimize visual-spatial intelligence of children aged 4-5 years. Then the observation sheet will use a questionnaire to measure visual-spatial abilities in children aged 4-5 years at Dharma Wanita Persatuan Gresik Kindergarten. The questionnaire will be given to parents

online using a Google form through an appeal from the school. The instrument points are attached in attachments 1 – 4.

D. Data Analysis

Data analysis in this study is divided into two parts:
1. Prior to the empirical test, validity and reliability tests were carried out on the question items in the questionnaire. Analysis of the data used is Pearson correlation or product moment to see the level of validity of the item or question and determine the feasibility of the statement item. Then perform a reliability test using Cronbach's alpha formula to determine the level of reliability in the instrument.
2. After testing the validity and reliability of the instrument, the next step is to clarify the child's average score (mean) on the child's visual-spatial ability in understanding geometric shapes.

This stage aims to get an overview of the visual-spatial ability in children. In addition, the instrument to test the effectiveness of the application-based color geometry maze game is carried out through only 1 stage; the feasibility test of material experts and media experts.

III. RESULTS AND DISCUSSION

The feasibility of this application-based Geomaze game media is evidenced by a validation test carried out by media experts and material experts by PG PAUD UNESA lecturers. The acquisition of the material validation test in the application-based Geomaze game shows a mean value of 3.75 which is close to a score of 4 which shows a range of 76-100 which means that the material validation test is declared very effective. Then the media validation test value gets a mean value of 3.70 which is close to a score of 4 with a range of 76-100 which indicates that the media validation test is declared very effective. From the results of the material and media validation tests, it can be concluded that the application-based Geomaze game media is very feasible to be tested on children.

In addition to conducting validation tests on material experts and media experts, researchers also conducted validation tests on PAUD teachers with a minimum educational qualification of S1 PAUD by distributing a questionnaire in the form of a Google form that was accessed via a link to support the validation of material experts and media experts. Based on the results of the descriptive test of the application-based Geomaze game material and media conducted by the teacher, it can be concluded that the display item has a mean value of 3.91 approaching a score of 4 with a range of 76-100, which means that the respondent's response states that the display level on the Geomaze game media on the application is very effective. Furthermore, the material presentation items receive a mean value of 3, 77 which is close to a score of 4 with a range of 76-100, which means that respondents' responses state that the level of presentation of material on application-based Geomaze game media is very effective. Then for the benefit item, the mean value is 3.81, close to a score of 4 with a range of 76-100, which means that the respondent's responses state that the level of effectiveness in the application-based Geomaze game media is very

effective.

The next is the results of the validity test on each item of parents' perceptions of the visual-spatial intelligence of children aged 4-5 years. The question items given are valid. The calculation of the validity test was carried out using IBM SPSS 20 with a significance level of 0.05 with the results of r-count above (0.514) on each question item, which means that the value of r-count > r-table so that the data obtained for each question item was declared valid.

The reliability test on the parental perception questionnaire on children's visual-spatial intelligence using the Cronbach's Alpha formula showed the result (0.832), and then the parent questionnaire on the use of application-based Geomaze game media was (0.892). From these results it can be interpreted that the coefficient value of parents' perceptions of children's visual-spatial intelligence and application-based Geomaze game media is above 0.6. From the results of the reliability test both questionnaires proved reliable.

After the Validity Test and Reliability Test were declared valid and reliable, the Classic Assumption Test was carried out, namely the Normality Test and the Homogeneity Test.

Table (1)
Normality and Homogeneity Test

	Normality (Shapiro-Wilk)	Homogeneity
X1	0,139	0,252
X2	0,921	0,092

Note: X1: App-based Geomaze Game; X2: Conventional Media

Based on the Normality test, the residual value is said to be normal if the Sig value > 0.05. Table 1 shows that the two variables have a significance value of (0.139) for application-based Geomaze game media and (0.921) for conventional media or LKA, which means the value of Sig is greater, so that the values of the two variables are normally distributed. And from the homogeneity test, the significance value of the application-based Geomaze game media variable shows a value of (0.252) and the significance value of the conventional media variable or LKA shows a value of (0.092). Then both sig values are greater than 0.05 then the data in this study is said to have the same variance or homogeneity.

Application-based Geomaze game media is effective to stimulate visual-spatial intelligence of children aged 4-5 years. It can be seen from the analysis of media feedback given to parents in the form of a questionnaire via Google form using descriptive statistical analysis. The following rubric is used;

Table (2)
Scoring Rubric Descriptive Test

Score	Application-Based Geomaze Game			Conventional Media		
Items	Mean	Std. Deviation	Effectivennes Score	Mean	Std. Deviation	Effectivenes Score
Color Sensitivity	3,40	0,49	3	3,03	0,61	3
Knowing Geometry	3,33	0,47	3	3,27	0,58	3
Knowing Directions	3,56	0,50	4	3.04	0,60	3
Geometry and Objects	3,44	0,50	3	2,98	0,65	3

Refer to Table 2, the following table is the comparison of mean and standard deviation between application-based geomaze game and conventional media.

Table 3, shows the results of feedback from parents on children's visual-spatial intelligence conducted by filling out an online survey via Google form and the following descriptive test results were obtained:

1) Color Sensitivity Items:

The color sensitivity item on the application-based geomaze game media shows a mean value of (3.40), close to a score of 3 which indicates a range of 21-30, meaning that the color sensitivity item on children's spatial intelligence on geometry puzzle media develops as expected. In conventional media using LKA, the color sensitivity item shows the mean of (3.03), close to 3 which indicates a range of 21-30, meaning that the color sensitivity items on children's spatial intelligence using the LKA develop as expected.
(source: IBM SPSS 20 data output)

2) Knowing Geometry Items:

Items recognizing geometry in application-based Geomaze game media show a mean value of (3.33), approaching a score of 3 which indicates a range of 21-30, meaning that items recognizing geometry in application-based Geomaze games develop as expected. Then in conventional media using LKA, the item recognizing geometry shows a mean value (3.27), close to number 3 which indicates a range of 21-30, meaning that items recognizing geometry in children's visual-spatial intelligence using conventional media develop as expected.

3) Item Knowing Directions

The item knowing direction in application-based Geomaze game media shows a mean value of (3.56), close to a score of 4 which indicates a range of 31-40, meaning that the item recognizing direction in children's spatial visual intelligence on Geomaze game media is developing very well. Meanwhile, as in conventional media using LKA, the item knowing direction shows the mean value of (3.04), close to a score of 3

which indicates a range of 21-30, meaning that the item recognizing direction in children's visual spatial intelligence using conventional media develops as expected.

Table (3)
The Comparison of Mean and Standard Deviation Between Application-Based Geomaze Game and Conventional Media

Score	Range	Information
1	0 – 10	Undeveloped
2	11 – 20	StartGrowing
3	21 – 30	Growing As Expected
4	31 – 40	Very Well Developed

4) Geometry and Objects Items

Geomaze items and objects in application-based Geomaze game media show a mean value of (3.44), close to a score of 3 which indicates a range of 21-30, meaning that geometry items and objects in application-based Geomaze game media develop as expected. In conventional media or LKA, geometry items and objects show a mean value of (2.98), which is close to a score of 3 with a range of 21-30, meaning that geometry items and objects in conventional media develop as expected.

After the Classical Assumption Test and Descriptive Analysis, then Regression Analysis is carried out, which is used to determine the effect of the variables. In this study, the application-based Geomaze game media is used as a treatment group variable and conventional media or LKA as a control group. The following are the results of multiple regression analysis calculations:

Table (4)
The Influence of Two Media on Visual Spatial Intelligence of Children Age 4-5 Years

Variable	Reggresion Coefficient	t(t-table= 2.179)	Sig.
Constant	7,046		
X1	0,570	3,103	0,009
X2	0,237	1,766	0,103

(source: IBM SPSS 20 data output)

Note: Y   : Visual Spatial Intelligence of 4-5 Years Old Children ; X1 : Application-Based Geomaze Game Media; X2 : Conventional Media or LKA

Marlius (2018), hypothesis testing uses the assumption that the significance level of the alternative hypothesis or Ha accepted is below 0.05, which means that there is an effect on the dependent variable. And the alternative hypothesis or Ha is rejected if the significant value is greater than 0.05, which means that there is no effect on the dependent variable. If it is seen in the table above that the value of (Sig.) X1 is 0.009 <

0.05, then H1 is acceptable, which means that there is an influence of the application-based Geomaze game media on the visual-spatial intelligence of children aged 4-5 years. While the value of (sig.) X2 is 0.103 > 0.05, then H2 is not accepted, which means that there is no influence of conventional media or LKA on visual-spatial intelligence of children aged 4-5 years. So it can be concluded that the application-based Geomaze game media affects the visual-spatial intelligence of children aged 4-5 years. These results are supported by Musfiroh & Tadkiroatun (2005), that children's visual-spatial intelligence is related to the child's ability to capture color, know direction and space accurately and change the visual capture into other forms such as decoration, architecture, painting, and sculpture.(Lestari et al., 2018). Children with visual-spatial intelligence will tend to be easier to understand a perception or visual that includes sensitivity to color, line and shape, space, form.

CONCLUSION

The problem of children's visual-spatial intelligence can cause children to be less able to recognize colors and distinguish geometric shapes. To overcome this problem, the results of the current study show that the Geomaze game media can stimulate the visual-spatial intelligence of children aged 4-5 years in Gresik, especially TK Kusuma Bangsa and TK Dharma Wanita Persatuan 1 Gresik Regency.

In learning, using the application-based Geomaze game, it is proven to be effective in stimulating visual-spatial intelligence of children aged 4-5 years, especially in recognizing geometric shapes and colours. From the obtained data, it can be concluded that the application-based Geomaze game media is effective for stimulating visual-spatial intelligence of children aged 4-5 years. This is evidenced by the results of the Regression Test showing that there is an influence of application-based Geomaze game media on the visual spatial intelligence of children aged 4-5 years. The conventional media or LKA shows that there is no influence of conventional media or LKA on the visual-spatial intelligence of children aged 4-5 years. In line with previous research by Wahyuni (2017) which shows that maze playing media can improve children's visual-spatial intelligence in RA Sabariyah, Harjosari II Sub-district, Medan Amplas District, 2015/2017 academic years this is shown from the results of research that continue to increase in each cycle.

The implication of this research is that the use of geomaze game media is effective in stimulating visual-spatial intelligence of children aged 4-5 years in recognizing colors and geometric shapes. The selection of appropriate and influential learning media for children's visual-spatial intelligence is very important. This application-based Geomaze game media is effectively used as a learning support to stimulate children's visual-spatial intelligence while at school or at home as online learning during the current Covid-19 pandemic.

Parents and teachers truly do need to stimulate and improve children's visual-spatial intelligence. Efforts to stimulate intelligence can be done by providing media for children that are varied, innovative, and interesting which are children's favorites. It aims to make children happy and interested in learning without any coercion so that children will not get bored easily. In this regard, this application-based Geomaze game can be considered as a tool or medium in providing a good impact on children's visual-spatial intelligence. For further research, it is recommended to carry out development to come up with newer and innovative ideas.

REFERENCES

Apriani, S. (2013). Mengembangkan Kemampuan Visual Spasial Melalui Kegiatan Membentuk Finger Painting Kelompok B di TKIT Luqmanul Hakim. Skripsi, 11.

Asmiarti, D., & Winangun, G. (2018). The Role of YouTube Media as a Means to Optimize Early Childhood Cognitive Development. 2.

Fathonah, M. F., Wahyuningsih, S., & Syamsuddin, M. M. (2020). Efektivitas Media Audio VIisual Terhadap Kecerdasan Visual Spasial Anak Usia 5-6 Tahun. Kumara Cendekia, 8(2), 143. https://doi.org/htpps://doi.org/10.20961/kc.v8i2.39789

Fitrianingsih, Y., Suhendri, H., & Astriani, M. M. (2019). Pengembangan Media Pembelajaran Komik Matematika Bagi Peserta Didik Kelas VII SMP / MTS Berbasis Budaya. Jurnal PETIK, 5(2), 38–40. https://doi.org/https://doi.org/10.31980/jpetik.v5i2.567

Hakim, A. (2017). Upaya Meningkatkan Kecerdasan Visual Spasial Melalui Permainan Puzzle pada Anak Kelompok A di TK Aisyiyah Pabelan Kartasura Sukoharjo Tahun Ajaran 2016/2017. Skripsi.

Hardianto, I., Wiryokusumo, I., & Walujo, D. A. (2018). Developing Non-Fiction Book on Animal Characteristics to Stimulate Cognitive Development of Early Childhood. International Journal For Innovation Education and Research, 6(12), 255. https://doi.org/https://doi.org/10.31686/ijier.Vol6.Iss12.1275

Hernia, H. (2013). Kemampuan Mengenal Warna Pada Anak Usia 4-5 Tahun di TK Segugus III Kecamatan Panjatan Kabupaten Kulon Progo. Skripsi, 4.

Lestari, A. T. (2016). Pengaruh Permainan Maze Terhadap Kemampuan Geometri Anak Kelompok B di TK Dharma Wanita Persatuan Babat Toman. Skripsi, 16.

Lestari, D., Munawar, M., & Karmila, M. (2018). Upaya Meningkatkan Kecerdasan Visual-Spasial Melalui Kegiatan Membatik Pada Anak Usia 4-5 Tahun Di KB-TK Khodijah 04 Tembalang Tahun pelajaran 2016/2017. PAUDIA,7(1),4. https://doi.org/htpps://doi.org/10.26877/paudia.v7i1.248

Marlius, D. (2018). Pengaruh Dimensi Kualitas Pelayanan Website Akademik Terhadap Kepuasan Mahasiswa Pada Stie "Kbp." Jurnal Ipteks Terapan, 12(2), 122. https://doi.org/10.22216/jit.2018.v12i2.633

Pa'indu, S., Sinaga, R., & Keriapy, F. (2020). Studi Kecerdasan Visual-Spasial Pada Anak Usia 5-6 Tahun Melalui Sentra Balok. Jurnal Teologi Dan Pendidikan Kristiani, 1(1),82.http://hologos.college/ejournal/index.php/shamayim/indx

Pradenastiti, N. (2019). Pengaruh Penggunaan Metode Permainan Mencari Jejak Untuk Meningkatkan Kecerdasan Visual Spasial Anak. Skripsi, 14–15, 44.

Prasusilantari, R. (2019). Pengembangan Kecerdasan Visual Spasial Anak Menggunakan Teknik Kolase pada Kelompok B di TK Islam Kecamatan Tuntang Kabupaten Semarang Tahun Pelajaran 2018/2019. Skripsi, 27–28.

Quroisin, H. (2015). Meningkatkan Kemampuan Kognitif Bentuk Geometri dengan Menggunaan Media Alam Sekitar di TK PGRI 79/03 Ngaliyan, Semarang. Skripsi, 4.

Rachmawati, Y. (2019). Hubungan antara Kegiatan Bermain Maze dengan Kecerdasan Visual-Spasial Anak Usia Dini. Jurnal Pendidikan Raudhatul Athfal, 2(2), 76, 79–80. https://doi.org/10.15575/japra.v2i2.9731

Ramadani, I. R. (2018). Upaya Meningkatkan Kecerdasan Visual Spasial Melalui Permainan Maze pada Anak Kelompok A di BA Aisyiyah Keduangan Pedan Klaten. Skripsi, 12.

Rosidah, L. (2014). Peningkatan Kecerdasan Visual Spasial Anak Usia Dini Melalui Permainan Maze. Jurnal Pendidikan Anak Usia Dini, 8(2), 291. https://doi.org/https://doi.org/10.21009/JPUD.082.09

Sani. A, & Ridwan,. 2018. Penelitian Pendidikan. Medan: Tira Smart.

Soraya, A., & Hasmalena, S. (2019). Pengembangan Alat Permainan Edukatif Fakta Dasar Penjumlahan Bilangan (1-10) Pada Anak Kelompok B. Tumbuh Kembang: Kajian Teori Dan Pembelajaran AUD, 6(1), 3. https://doi.org/htpps://doi.org/10.36706/jtk.v6i1.8348

Sujiono. Y. N & Sujiono. B. 2010. Bermain Kreatif Berbasis Kecerdasan Jamak. Jakarta: Indeks.

Wahyuni, & Pusari, R. W. (2015). Upaya Meningkatkan Kemampuan Visual Spasial Anak Melalui Bermain di Sentra Balok Pada Kelompok A TK Himawari Semarang. Jurnal PAUDIA, 98–99. https://doi.org/htpps://doi.org/10.26877/paudia.v4i1.162

Apriani, S. (2013). Mengembangkan Kemampuan Visual Spasial Melalui Kegiatan Membentuk Finger Painting Kelompok B di TKIT Luqmanul Hakim. Skripsi, 11.

Asmiarti, D., & Winangun, G. (2018). The Role of YouTube Media as a Means to Optimize Early Childhood Cognitive Development. 2. https://doi.org/https://doi.org/10.1051/matecconf/201820500002

Fathonah, M. F., Wahyuningsih, S., & Syamsuddin, M. M. (2020). Efektivitas Media Audio VIisual Terhadap Kecerdasan Visual Spasial Anak Usia 5-6 Tahun. Kumara Cendekia, 8(2),143. https://doi.org/htpps://doi.org/10.20961/kc.v8i2.39789

Fitrianingsih, Y., Suhendri, H., & Astriani, M. M. (2019). Pengembangan Media Pembelajaran Komik Matematika Bagi Peserta Didik Kelas VII SMP / MTS Berbasis Budaya. Jurnal PETIK, 5(2), 38–40. https://doi.org/https://doi.org/10.31980/jpetik.v5i2.567

Hakim, A. (2017). Upaya Meningkatkan Kecerdasan Visual Spasial Melalui Permainan Puzzle pada Anak Kelompok A di TK Aisyiyah Pabelan Kartasura Sukoharjo Tahun Ajaran 2016/2017. Skripsi.

Hardianto, I., Wiryokusumo, I., & Walujo, D. A. (2018). Developing Non-Fiction Book on Animal Characteristics to Stimulate Cognitive Development of Early Childhood. International Journal For Innovation Education and Research,6(12),255. https://doi.org/https://doi.org/10.31686/ijier.Vol6.Iss12.1275

Hernia, H. (2013). Kemampuan Mengenal Warna Pada Anak Usia 4-5 Tahun di TK Segugus III Kecamatan Panjatan Kabupaten Kulon Progo. Skripsi, 4.

Lestari, A. T. (2016). Pengaruh Permainan Maze Terhadap Kemampuan Geometri Anak Kelompok B di TK Dharma Wanita Persatuan Babat Toman. Skripsi, 16.

Lestari, D., Munawar, M., & Karmila, M. (2018). Upaya Meningkatkan Kecerdasan Visual-Spasial Melalui Kegiatan Membatik Pada Anak Usia 4-5 Tahun Di KB-TK Khodijah 04 Tembalang Tahun pelajaran 2016/2017. PAUDIA,7(1),4. https://doi.org/https://doi.org/10.26877/paudia.v7i1.248

Marlius, D. (2018). Pengaruh Dimensi Kualitas Pelayanan Website Akademik Terhadap Kepuasan Mahasiswa Pada Stie "Kbp." Jurnal Ipteks Terapan, 12(2), 122. https://doi.org/10.22216/jit.2018.v12i2.633

Musfiroh, Tadkiroatun. 2005. Bermain Sambil Belajar dan Mengasah Kecerdasan. Jakarta. Depdiknas

Pa'indu, S., Sinaga, R., & Keriapy, F. (2020). Studi Kecerdasan Visual-Spasial Pada Anak Usia 5-6 Tahun Melalui Sentra Balok. Jurnal Teologi Dan Pendidikan Kristiani, 1(1),82. http://hologos.college/ejournal/index.php/shamayim/indx

Pradenastiti, N. (2019). Pengaruh Penggunaan Metode Permainan Mencari Jejak Untuk Meningkatkan Kecerdasan Visual Spasial Anak. Skripsi, 14–15, 44.

Prasusilantari, R. (2019). Pengembangan Kecerdasan Visual Spasial Anak Menggunakan Teknik Kolase pada Kelompok B di TK Islam Kecamatan Tuntang Kabupaten Semarang Tahun Pelajaran 2018/2019. Skripsi, 27–28.

Quroisin, H. (2015). Meningkatkan Kemampuan Kognitif Bentuk Geometri dengan Menggunaan Media Alam Sekitar di TK PGRI 79/03 Ngaliyan, Semarang. Skripsi, 4.

Rachmawati, Y. (2019). Hubungan antara Kegiatan Bermain Maze dengan Kecerdasan Visual-Spasial Anak Usia Dini. Jurnal Pendidikan Raudhatul Athfal, 2(2), 76, 79–80. https://doi.org/10.15575/japra.v2i2.9731

Ramadani, I. R. (2018). Upaya Meningkatkan Kecerdasan Visual Spasial Melalui Permainan Maze pada Anak Kelompok A di BA Aisyiyah Keduangan Pedan Klaten. Skripsi, 12.

Rosidah, L. (2014). Peningkatan Kecerdasan Visual Spasial Anak Usia Dini Melalui Permainan Maze. Jurnal Pendidikan Anak Usia Dini, 8(2), 291. https://doi.org/https://doi.org/10.21009/JPUD.082.09

Soraya, A., & Hasmalena, S. (2019). Pengembangan Alat Permainan Edukatif Fakta Dasar Penjumlahan Bilangan (1-10) Pada Anak Kelompok B. Tumbuh Kembang: Kajian Teori Dan Pembelajaran AUD, 6(1), 3. https://doi.org/htpps://doi.org/10.36706/jtk.v6i1.8348

Wahyuni, & Pusari, R. W. (2015). Upaya Meningkatkan Kemampuan Visual Spasial Anak Melalui Bermain di Sentra Balok Pada Kelompok A TK Himawari Semarang. Jurnal PAUDIA, 98–99. https://doi.org/htpps://doi.org/10.26877/paudia.v4i1.162

Wahyuni, S. (2017). Peningkatan Visual Spasial Anak Melalui Kegiatan Bermain Maze pada Anak di RA Sabariyah Kelurahan Harjosari II Kecamatan Medan Amplas. Skripsi, i.

Winnuly, & Laksimiwati, H. (2013). Pengaruh Penggunaan Media Realita Terhadap Kecerdasan Visual Spasial Anak Kelompok A TK Dharma Wanita Desa Patihan Kecamatan Widang Kabupaten Tuban. Jurnal PAUDTeratai,2(2),2. https://jurnalmahasiswa.unesa.ac.id/index.php/paud-teratai/article/view/2428

Wulandari, A. D., Sumarni, S., & Rahelly, Y. (2018). Pengembangan Game Maze Berbasis Media Interaktif Sesuai Tema untuk Anak Usia 5-6 Tahun di TK Izzudin Palembang. Jurnal Pendidikan Anak, 7(1), 83. https://journal.uny.ac.id/index.php/jpa/article/view/26329/168

Yuliana, Syukuri, M., & Halida. (2016). Pemanfaatan Permainan Lego untuk Pengembangan Kecerdasan Visual Spasial di TK. Jurnal Pendidikan Dan Pembelajaran Khatulistiwa, 5(5),1. htpps://jurnal.untan.ac.id/index.php/jpdpb/article/view/15250