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Analysis of the Animated Film Numberblocks to Visual Spatial Intelligence in Children Aged 5-6 Years

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ABSTRACT

Visual-spatial intelligences is an important aspect of cognitive development. A study involving 10 children aged 5-6 years at an early childhood education in Yogyakarta found that 3 children had not developed optimally due to a lack of engaging learning media. This study aimed to analyze the use of the Numberblocks animated film to stimulate the visual spatial intelligence of children aged 5-6 years. The study used a qualitative method with a descriptive analytical approach. Data were collected through observation, interviews, and documentation. Data analysis used Miles and Huberman, namely data reduction, data presentation, and conclusions drawing. The findings showed that Numberblocks positively stimulated children's ability to recognize shapes, colors, patterns, and numbers. Its engaging visuals and animation improve children's visual understanding and observation skills. After using Numberblocks, 8 of the 10 children developed optimally, while 2 children showed progress toward optimal development. These findings indicate that animated media can be an engaging alternative learning medium for early childhood educators.

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1. INTRODUCTION

Visual spatial intelligence is a critical cognitive ability in early childhood, as it enables children to understand shapes, patterns, positions, directions, and relationships among visual elements. Research by Alkouri (2022) shows that spatial ability enables children to understand and process spatial relationship. While Fox et al. (2024) further demonstrates that various spatial activities can promote the development of spatial skills in preschoolers. These findings suggest that children need learning experiences that offer opportunities to observe and process diverse visual and spatial information. The use of animated media, which combines shapes, colors, patterns, movement, and symbol is an attractive alternative for providing visual-spatial stimulation to children aged 5-6 years.

Visual spatial intelligence play a role important in support development imagination, creativity, and ability solution problems in children age early. Children who have good visual spatial intelligence tend capable recognize form, understanding patterns, as well as interpret visual information in more effective in activity study and activity daily (Hasanah et al., 2023a). Ability this also helps child in develop method think logical and creative through the visual exploration that they do during the learning process. The development visual spatial intelligence, children capable interpret visual information in more effective and use it in activity study (Akbar et al., 2025).

The digital era is an era where every element in life, one of them namely the educational process more know technology and use of digital platforms (Hidayah et al., 2026; Riyani et al., 2023). The development of digital technology in the modern era of education has brought significant changes to the learning process, particularly in the use of technology-based audiovisual learning media. Animated videos and interactive digital media have become alternative instructional resources that educators can use to enhance the quality of learning experiences in early childhood education (Hanif, 2020). The use of audiovisual media is considered effective in capturing children's attention and helping them understand learning concepts more concretely through the integration of engaging visual, auditory, and movement elements that stimulate their curiosity and interest in learning (Hasanah et al., 2023a; Yus & Saragih, 2023).

Based on results observation the beginning was carried out at Dharma Bakti II Karangjati Kindergarten against 10 children, it was revealed that visual spatial ability child aged 5-6 years still not yet reach maximum development. The observation revealed that 3 of the 10 children struggled to recognize simple geometric shapes, arrange patterns, and understand positional and spatial relationships during learning activities. This is seen from existence children who are still face challenge in identify geometric shapes simple, composing patterns, as well as understand connection position and space in activity learning. This aligns with previous research demonstrating that constructive play with blocks can enhance children's visual-spatial abilities through activities involving stacking, shaping, and developing a concrete understanding of relationships between objects (Dini, 2021).

However, that study focused primarily on the use of blocks for constructive play and didn't examine the use of audiovisual media such as animated films, as a means to stimulate children's visual-spatial intelligence. This limitation highlights a research gap regarding the use of a animated media, which dynamically presents shapes, colors, patterns, movement, and visual-spatial development.

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The findings of the initial observation align with this research, which indicates that diverse learning activities and the use of instructional media can provide engaging visual experiences for young children. According to research conducted by Insani & Firdaus (2024), one rapidly evolving technology that can be utilized in education is augmented reality (AR). This technology enables the real-time integration of real and virtual objects within the physical world. The use of AR makes the learning experience more interactive and engaging while also supporting children's visual-spatial intelligence possible merger object real and virtual objects direct in the real world. Research conducted by Insani & Firdaus (2024) developed an augmented reality (AR)-based application for 3D shapes to enhance children's spatial intelligence. Their findings indicate that augmented reality (AR) helps children understand spatial shapes, directions, sizes, and the visualization of objects more concretely through interactive learning experiences. However, the study focused on the development of AR media and did not examine the use of animated films as an audiovisual medium to stimulate children's visual-spatial intelligence. This limitation presents an opportunity to investigate animated media that integrates shapes, colors, patterns, movement, and numerical symbols into a single visual experiences.

Another study conducted by Herlina et al. (2023) the findings indicated that digital learning media could assist children in recognizing shapes, colors, visual objects, and spatial orientation, while also enhancing their focus and engagement during lessons. However, that study utilized a virtual classroom platforms as the learning medium and didn't specifically examine educational animated films as a source of visual-spatial stimulation. This distinction highlights the need for the further research into audiovisual media that present visual elements dynamically.

Research by Putri & Amalia (2026) the findings indicated that "Numberblocks" helps children recognize numbers, numerical patterns, and number grouping as well as solve simple mathematical problems through engaging and interactive visual. However, that study positioned "Numberblocks" primarily as a medium for developing mathematical-logical intelligence and didn't analyze the visual-spatial elements inherent in the animation. A gap exists regarding the relationship between the us of "Numberblocks" and children's abilities to recognize shapes, colors, patterns, spatial concepts, and visual representations.

Research conducted by Fitri (2025), show that animation media interactive capable increase children's visual attention, ability recognize symbol, focus learning and interest child to learning based digital technology. Display picture moving, color bright, and interactive audio make child more easy understand material learning. Focus study this lies in the development of animation media mobile learning interactive digital based for learning child age early will but this media not yet in a way specific discuss visual spatial intelligence child age early. This limited scope suggests that the potential of visual elements within animation media warrants further investigation regarding their role in visual-spatial stimulation.

Research by Hasanah et al. (2023b), show that learning model based project based learning can help child express visual objects, recognizing shape details, and improving ability describe object based on results visual observation. Research This only focuses on the implementation of the project based learning model in a way general without studying animated digital media as means visual spatial stimulation child. This gap suggests a need to investigate different learning approaches specifically audiovisual media that align with children's digital experiences.

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Although previous studies have demonstrated the potential of various learning approaches and digital media to support children's development, several aspects remain insufficiently explored. Previous research has examined constructive play using blocks, augmented reality (AR), virtual classroom platforms, animated learning media, and Project-Based Learning to support children's cognitive and visual development. However, these studies have generally focused on specific learning media or developmental outcomes, such as logical-mathematical intelligence, shape recognition, visual attention, symbol recognition, and general visual observation skills. The use of animated media has also been explored primarily in relation to mathematical learning and digital learning engagement rather than specifically addressing children's visual-spatial intelligence. Consequently, there remains a research gap concerning the potential of animated films as audiovisual learning media to stimulate children's visual-spatial intelligence through the integrated presentation of geometric shapes, colors, patterns, movement, and spatial relationships. In particular, further investigation is needed to understand how these visual elements can provide meaningful learning experiences that support children's ability to recognize, interpret, and understand visual and spatial information.

This study contributes to the development of early childhood education by expanding the discussion of visual-spatial intelligence stimulation through the use of animated films as audiovisual learning media. Theoretically, it provides an additional perspective on how dynamic visual representations can support children's understanding of visual and spatial concepts. Practically, this study offers an alternative learning medium for early childhood educators to create more engaging learning experiences by integrating various visual and spatial elements into learning activities. Furthermore, the study emphasizes the importance of selecting learning media that are not only attractive and entertaining but also relevant to children's developmental needs and learning objectives.

The novelty of this study lies in its specific focus on animated films as a medium for stimulating children's visual-spatial intelligence, rather than primarily using animation to support mathematical understanding or general digital learning engagement. Unlike previous studies that have examined visual development through separate approaches or specific learning technologies, this study considers the potential of animated films to integrate geometric shapes, colors, patterns, movement, and spatial relationships within a continuous audiovisual learning experience. This integrated perspective provides a different approach to understanding the role of animated media in stimulating children's visual-spatial intelligence and extends the discussion of digital learning media in early childhood education.

2. METHODS

This study employed a qualitative approach using a descriptive analysis method. Purpose from approach this is for explain in a way details how animated films *Number blocks* can stimulate visual spatial intelligence in children aged 5-6 years. Qualitative research is a research method used to examine objects in their natural conditions without manipulating variables, with data presented in the form of words, narratives, and interpretations of the phenomena being studied (Chand, 2025). The researcher serves as the primary instrument in data collection, while data sources are selected through purposive and snowball sampling

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techniques. Focus study this lies on influence use of animated films *Number blocks* to ability to recognize color, shape, and size object through animation Numberblocks.

Data sources in studies this obtained from individuals who can supply data accordingly with needs research. Individual the known as informant or respondents (Saadah & Windiarti, 2023). Research was held at Dharma Bakti II Karangjati Kindergarten, Mlati District, Sleman Regency, DIY. The data sources used were covering head school, 1 teacher, participant educate Class B consisted of 10 students involved in Dharma Bakti II Kindergarten. In this qualitative study of early childhood education, participants were selected from relevant groups, including teachers as facilitators of the learning process and children as learners or research participants.

Data collection techniques were conducted through observation. Observation was used to directly observe children's behavior, interactions, and learning activities in natural situations so that researchers could understand the phenomena that occurred contextually. The use of this technique served as a form of data triangulation to increase the validity and accuracy of research results. observation, researcher can get more data real about response, involvement, ability, and development child during the learning process ongoing, including How child know visual form, color and express ideas through activity drawing and coloring. The following table presents the indicators of visual-spatial development in children aged 5-6 years based on Viktor Lowenfeld's theory, as discussed by Hamka (2023). Further details are provided in **Table 1**.

Table 1. Indicators Visual Spatial Development of Children Aged 5-6 Years

No	Aspect	Sub Aspect	Analysis Results
1.	Understanding Visual Forms	a) Recognizing Numbers 1-6 b) Recognizing Geometric Shapes	
2.	Understanding Colors	a) Recognizing Various Colors b) Coloring Pictures with Detail	

Source: (Wahyuni, 2023)

Data analysis technique used the Miles and Huberman analysis model, which includes three stages: data collection, data reduction, data display, and conclusion drawing. Data reduction is carried out by selecting and focusing on data relevant to the research objectives. The reduced data is presented in descriptive form for easier understanding. The final stage is drawing conclusions by interpreting the analyzed data to provide an overview of the influence of animated films. The data analysis process in this study, which examined the use of Numberblocks to support the visual-spatial intelligence of children aged 5-6 years, is illustrated in the following **Figure 1**.

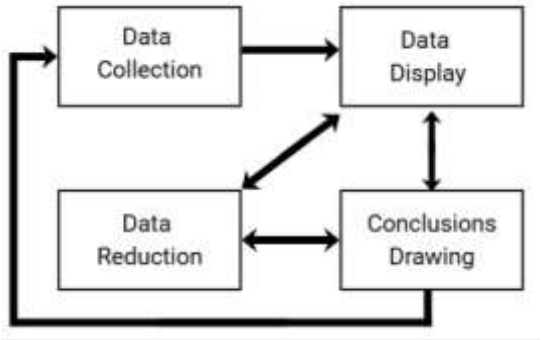


Figure 1. Data Analysis Flow

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3. RESULTS AND DISCUSSION

3.1 Results of Understanding Visual Forms of Images and Colors

3.1.1 NTN's Work Results

Observation of the work of a child identified as NTN indicate that he is able to recognize various visual forms, including number symbols, geometric patterns, and colors. This ability is also evident in his drawing and coloring activities. More detailed observations of NTN's visual-spatial development are presented in **Table 2**.

Table 2. Children's Work Results

No	Aspect	Sub Aspects	Analysis Results
1	Understanding Visual Form of Image	Know form numbers 1-16	Children are able write numbers 1-16
		Know pattern geometry	Children are able know pattern geometry
2	Understanding Color	Know various type color	Children are able know various type color
		Coloring picture in detail	Children are able coloring picture in detail

The work produced by the child with the initials NTN demonstrated well-developed visual-spatial abilities, as evidenced by the child's ability to spontaneously write numerical symbols, recognize numerical patterns in sequence from 1 to 16, draw geometric shapes, identify various colors, and color pictures with considerable detail. When completing the worksheet, NTN appeared relaxed and took considerable time to color the picture, resulting in an inability to finish all the assigned tasks within the allocated time. Nevertheless, the quality of the completed work was good, indicating that NTN demonstrated relatively well-developed visual-spatial abilities in accordance with the expected developmental standards for their age, as illustrated in **Figure 2.**



Figure 2. NTN's Work Results

3.1.2 RDN's Work Results

Based on observations, RDN demonstrated good abilities in understanding various visual forms. This was evident in the child's ability to write number symbols, recognize geometric patterns, name various colors, and color pictures with sufficient detail. Details of the observations of RDN's work can be seen in **Table 3**.

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Table 3. Children's Work Results

No	Aspect	Sub Aspects	Analysis Results
1.	Understanding Visual Form of Image	Know Number Forms 1-16	Children are able write numbers 1-16
		Know pattern geometry	Children are able know pattern geometry
2.	Understanding Color	Know various type color	Children are able know various type color
		Coloring picture in detail	Children are able coloring picture in detail

The work produced by the child with the initials RDN demonstrated well-developed visual-spatial abilities, as evidenced by the child's ability to spontaneously write numerical symbols, recognize numerical patterns in sequence from 1 to 16, draw geometric shapes, identify various colors, and color pictures in detail. These abilities indicate that RDN's visual-spatial development was progressing well and was consistent with the expected developmental standards for the child's age, as illustrated in **Figure 3**.



Figure 3. RDN's Work Results

3.1.3 ZHR's Work Results

ZHR's work demonstrates that the child has demonstrated several indicators of visual-spatial development. These abilities are demonstrated through activities such ad recognizing and writing number symbols, understanding geometric patterns, and recognizing various colors. The results of the analysis of ZHR's visual-spatial abilities are presented in **Table 4**.

Table 4. Children's Work Results

No	Aspect	Sub Aspects	Analysis Results
1.	Understanding Visual Form of Image	Know Number Forms 1-16	Children are able write numbers 1-16
		Know pattern geometry	Children are able know pattern geometry
2.	Understanding Color	Know various type color	Children are able know various type color
		Coloring picture in detail	Children are able coloring picture in detail

The work produced by the child with the initials ZHR demonstrated well-developed visual-spatial abilities, as evidenced by the child's ability to spontaneously write numerical symbols, recognize numerical patterns in sequence from 1 to 16, draw geometric shapes, identify various colors, and color pictures in detail. These abilities indicate that ZHR's visual-spatial

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development was progressing well and was consistent with the expected developmental standards for the child's age, as illustrated in **Figure 4**.



Figure 4. ZHR's Work Results

3.1.4 ALS's Work Result

Observations of ALS's work indicate that the child has developed the ability to recognize visual shapes and understand number patterns. He is also able to name various colors and color pictures quite well. However, he still needs more time to complete the coloring activity. the results of these observations are presented in **Table 5**.

Table 5. Children's Work Results

	Aspect		Sub Aspects	Analysis Results
1.	Understanding Form of Image	Visual	Know form numbers 1-16	Children are able write numbers 1-16
			Know pattern geometry	Children are able know pattern geometry
2.	Understanding Color		Know various type color	Children are able know various type color
			Coloring picture in detail	Children are able coloring picture in detail

The work produced by the child with the initials ALS demonstrated well-developed visual-spatial abilities, as evidenced by the child's ability to spontaneously write numerical symbols, recognize numerical patterns in sequence from 1 to 16, draw geometric shapes, identify various colors, and color pictures in detail. During the worksheet activities, ALS appeared relaxed and took considerable time to color the pictures, resulting in an inability to complete all the assigned tasks within the allocated time. Nevertheless, the quality of the completed work was good, indicating that ALS demonstrated relatively well-developed visual-spatial abilities in accordance with the expected developmental standards for the child's age, as illustrated in **Figure 5**.

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Figure 5. ALS's Work Results

3.1.5 FNN's Work

Unlike the other children, the initial observations indicated that FNN's visual-spatial abilities still required further stimulation. However, subsequent observations showed progress in the development of these abilities. This improvement was evident in FNN's ability to write numerical symbols correctly and recognize geometric patterns. Nevertheless, FNN still experienced difficulties following instructions when coloring pictures. A summary of the observations of FNN's visual-spatial abilities is presented in **Table 6**.

Table 6. Children's Work Results

No	Aspect	Sub Aspects	Analysis Results
1.	Understanding Visual Form of Image	Know form numbers 1-16	Children are able write numbers 1-16
		Know pattern geometry	Children are able know pattern geometry
2.	Understanding Color	Know various type color	Children are able know various type color
		Coloring picture in detail	Children are able coloring picture in detail

The work produced by the child with the initials FNN indicated that their visual-spatial development had not yet progressed optimally. This was evident in the child's difficulty following numerical sequences, limited ability to draw various geometric shapes, and ability to identify different colors but not yet color pictures in detail. Furthermore, FNN still required teacher assistance to complete the assigned worksheet tasks. These findings indicate that FNN's visual-spatial development had not yet met the expected developmental standards for their age, as illustrated in **Figure 6**.



Figure 6. FNN's Work Results

3.1.6 KNZ's Work

Observations of KNZ revealed several indicators of suboptimal visual-spatial abilities. The child still had difficulty writing number symbols correctly, recognizing geometric patterns, and

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completing coloring activities. Details of the observations of KNZ's work are presented in **Table 7**.

Table 7. Children's Work Results

No	Aspect	Sub Aspects	Analysis Results
1.	Understanding Visual Form of Image	Know form numbers 1-16	The child is still upside down in write numbers 1-16
		Know pattern geometry	The child is not yet know pattern geometry
2.	Understanding Color	Know various type color	The child is not yet know various type color
		Coloring picture in detail	The child is not yet capable coloring picture in detail

The work produced by the child with the initials KNZ indicated that their visual-spatial development had not yet progressed optimally. This was evident in the child's difficulty following numerical sequences, limited ability to draw various geometric shapes, and ability to identify different colors but not yet color pictures in detail. Furthermore, KNZ still required teacher assistance to complete the assigned worksheet tasks. These findings indicate that KNZ's visual-spatial development had not yet met the expected developmental standards for their age, as illustrated in **Figure 7**.



Figure 7. KNZ's Work Results

3.1.7 ALY's Work

ALY's work demonstrated that most indicators of visual-spatial development were well-executed. She has able to recognize geometric patterns, name various colors, and engage in drawing and coloring activities. The following analysis of ALY's work results is presented in **Table 8**.

Table 8. Children's Work Results

No	Aspect	Sub Aspects	Analysis Results
1.	Understanding Visual Form of Image	Know form numbers 1-16	The child is still upside down in write numbers 1-16
		Know pattern geometry	The child is not yet know pattern geometry
2.	Understanding Color	Know various type color	The child is not yet know various type color
		Coloring picture in detail	The child is not yet capable coloring picture in detail

The work produced by the child with the initials ALY demonstrated well-developed visual-spatial abilities, as evidenced by the child's ability to spontaneously write numerical symbols, recognize numerical patterns in sequence from 1 to 16, draw geometric shapes, identify

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various colors, and color pictures in detail. During the worksheet activities, ALY appeared relaxed and took considerable time to color the pictures, resulting in an inability to complete all the assigned tasks within the allocated time. Nevertheless, the quality of the completed work was good, indicating that ALY demonstrated relatively well-developed visual-spatial abilities in accordance with the expected developmental standards for the child's age, as illustrated in **Figure 8**.



Figure 8. ALY 's Work Results

3.1.8 ALF's Work

Based on observations, ALF still experiences difficulties in meeting several indicators of visual-spatial development. This is evident in the child's inability to write number symbols correctly, recognize geometric patterns, and distinguish between various colors. The child also still requires teacher assistance when completing assigned activities. The results of observations of ALS's work are presented in the **Table 9**.

Table 9. Children's Work Results

No	Aspect	Sub Aspects	Analysis Results
1.	Understanding Visual Form of Image	Know form numbers 1-16	The child is still upside down in write number dozens
		Know pattern geometry	Children are able know pattern geometry
2.	Understanding Color	Know various type color	Children are able know various type color
		Coloring picture in detail	Children are able coloring picture detail

The work produced by the child with the initials ALF indicated that their visual-spatial development had not yet progressed optimally. This was evident in the child's difficulty following numerical sequences, limited ability to draw various geometric shapes, and ability to identify different colors but not yet color pictures in detail. Furthermore, ALF still required teacher assistance to complete the assigned worksheet tasks. These findings indicate that ALF's visual-spatial development had not yet met the expected developmental standards for their age, as illustrated in **Figure 9**.

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Figure 9. ALF's Work Results

3.1.9 SKR's Work Result

Observations of SKR's work indicated that the child had demonstrated progress in various aspects of visual-spatial development. This was evident in SKR's ability to write numerical symbols, recognize geometric patterns, identify various colors, and color pictures with a reasonable level of accuracy. A detailed analysis of SKR's work is presented in **Table 10**.

Table 10. Children's Work Results

No	Aspect	Sub Aspects	Analysis Results
1	Understanding Visual Form of Image	Know Number Forms 1-16	Children are able write numbers 1-16
		Getting to Know Geometric Patterns	Children are able get to know geometric patterns
2	Understanding Color	Know various type color	Children are able know various type color
		Coloring picture in detail	Children are able coloring picture in detail

The work produced by the child with the initials SKR demonstrated well-developed visual-spatial abilities, as evidenced by the child's ability to spontaneously write numerical symbols, recognize numerical patterns in sequence from 1 to 16, draw geometric shapes, identify various colors, and color pictures in detail. During the worksheet activities, SKR appeared relaxed and took considerable time to color the pictures, resulting in an inability to complete all the assigned tasks within the allocated time. Nevertheless, the quality of the completed work was good, indicating that SKR demonstrated relatively well-developed visual-spatial abilities in accordance with the expected developmental standards for the child's age, as illustrated in **Figure 10**.



Figure 10. SKR's Work Results

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3.1.10 SN's Work Result

Observations of SN indicate that the child has achieved the visual-spatial development indicators observed. This ability is evident in the child's ability to write number symbols, recognize geometric patterns, name various colors, and color pictures in detail. The results of observations of SN's work are presented in **Table 11** below.

Table 11. Children's Work Results

No	Aspect	Sub Aspects	Analysis Results
1.	Understanding Visual Form of Image	Know form numbers 1-16	Children are able write numbers 1-16
		Know pattern geometry	Children are able know pattern geometry
2.	Understanding Color	Know various type color	Children are able know various type color
		Coloring picture in detail	Children are able coloring picture in detail

The work produced by the child with the initials SN demonstrated well-developed visual-spatial abilities, as evidenced by the child's ability to spontaneously write numerical symbols, recognize numerical patterns in sequence from 1 to 16, draw geometric shapes, identify various colors, and color pictures in detail. During the worksheet activities, SN appeared relaxed and took considerable time to color the pictures, resulting in an inability to complete all the assigned tasks within the allocated time. Nevertheless, the quality of the completed work was good, indicating that SN demonstrated relatively well-developed visual-spatial abilities in accordance with the expected developmental standards for the child's age, as illustrated in **Figure 11**.



Figure 11. SN's Work Results

3.2 Discussion

3.2.1 Analysis Understanding Visual Form of Image

The results of the initial observational analysis regarding the understanding of visual forms indicate that, out of 10 children, 3 exhibit delays in visual-spatial development. The child is still experience confusion in write numbers 1-16 so that write number still upside down, no sequential and not yet consistent. The child is also not yet capable understand pattern order number in a way right and also still difficulty in recognize forms geometry base that is shape, square, square long, star, pyramid, prism, cylinder and so on. Conditions the show that visual spatial ability child still be at the stage development beginning (Sulistyawati, 2024a).

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The implementation of instruction using animation media effectively stimulates children's visual-spatial development. This is evident from the fact that, following the use of "Numberblocks" animation media, the number of children whose visual-spatial abilities developed as expected rose from seven to eight, Meanwhile, the other two children are beginning to show good progress, although they still need help. These findings are consistent with previous studies showing that “Numberblocks” can support young children's recognition of colors, patterns, and numerical symbols (Putri, 2021). Other studies have also shown that themed animated videos that combine shapes, colors, patterns, and the positions of objects can also contribute to the development of children’s visual-spatial abilities (Khusna & Maryatun, 2026).

Visual-spatial ability refers to the capacity to understand relationships among shapes, patterns, spaces, positions, directions, and visual symbols through visual perception. This ability plays an important role in children's cognitive development because it provides a foundation for recognizing numerical symbols, geometric shapes, and colors, as well as understanding visual relationships among different forms and objects. Children whose visual-spatial skills have not yet developed fully tend to have difficulty distinguishing between shapes that look very similar, write numbers backward, and are unable to systematically understand visual patterns (Yang et al., 2023).

Based on results analysis above, there is consistent theory that is theory visual spatial intelligence as proposed by Gardner in Outhwaite et al. (2024) which explains that visual spatial intelligence related with ability individual in understand shape, color, line, space, and visual relationships right. Ability This develop through experience concrete, visual stimulation, games constructive, as well as activities that involve observation shapes and patterns. Children who have not capable know numbers and shapes geometry with good show that the processing process visual information still need more stimulation intensive. Difficulty child in write numbers 1-16 in order sequential also shows that child not yet capable connect visual symbols with draft number in a way intact. Visual spatial ability related close with development ability mathematics beginning, especially at the introduction numbers, patterns, and geometry in children age early (Outhwaite et al., 2024; Sulistyawati, 2024b; Yang et al., 2023).

Children who have not yet developed an adequate understanding of geometric shapes tend to experience difficulties in distinguishing the distinctive characteristics of different visual forms. For example, some children still confuse circles with ovals and squares with rectangles, indicating that their visual discrimination abilities have not yet developed optimally. Development ability geometry and perception spatial child influenced by visual stimulation, activity motor skills, learning media, and experience play that involves exploration shape and space. Children aged early requires concrete media and activities interesting play to be able to understand visual concept in more meaningful (Outhwaite et al., 2024).

Introduction numbers and shapes geometry at the stage beginning development children, some child still face difficulty in understand symbol numbers, because draft number nature abstract, whereas characteristics think child age early still be at the stage concrete. Phenomenon the in line with theory development cognition numeric child, who stated that understanding number not only just know symbols, but also includes ability understand draft order and value number with true. Ability remember order number develop in a way gradually, when child do error in write number so sign that ability the not yet optimal and also because

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limitations function executive and control cognitive in manage information symbolic (Coolen et al., 2023; Schliephake et al., 2023; Skagenholt et al., 2023).

The use of visual media through various activities, such as number puzzles, shape-matching games, constructive play, and multisensory learning media, is essential for supporting children's visual-spatial development. Animated videos can also serve as effective learning media because they present information through engaging moving images and age-appropriate stories. These features can support various aspects of children's development while providing meaningful learning experiences in early childhood education (Dewi & Tirtayani, 2023; Hidayah & Furnamasari, 2025; Laiya et al., 2023; Narasid & Rahman, 2025). This media is a designed learning strategy through diverse methods and techniques for convey material in a way effective (Afnita et al., 2022; Hidayah & Furnamasari, 2025; Sukmadewi & Suniasih, 2022). With appropriate stimulation, children's visual-spatial abilities can develop gradually, enabling them to recognize numerical symbols, understand sequential patterns, identify geometric shapes, and distinguish colors more effectively.

3.2.2 Analysis Understanding Color

Observations of color recognition during the “Numberblocks” animation activities revealed an increase in the number of children whose visual-spatial development met the expected criteria, from 7 to 8 out of 10 children. These children demonstrated improvements in selecting appropriate colors, distinguishing between different shades, and coloring within the outlines. However, two children continued to experience difficulties in distinguishing similar shades, following instructions, and coloring neatly, indicating that their visual-spatial abilities still required further stimulation to reach the expected developmental level (Trifunović et al., 2022).

Based on theory visual spatial intelligence according to Baumanns et al. (2024) explains that visual spatial ability related with ability understand shape, color, understanding position space, as well as control coordination eyes and hands when do activity coloring and drawing. Children with well-developed visual-spatial abilities tend to be more capable of recognizing visual details, maintaining color accuracy, understanding spatial boundaries within images, and demonstrating better visual-motor coordination. In contrast, children whose visual-spatial abilities are still developing tend to experience difficulties in identifying visual details, maintaining color accuracy, and drawing within designated outlines. These abilities are closely related to visual information processing, including color discrimination, visual attention, pattern recognition, and visual-motor integration, which play important roles in early childhood learning activities (Watanabe & Moriguchi, 2025).

Understanding colors provides valuable visual stimulation for the development of children's visual-spatial intelligence. Animation, which incorporates a variety of colors, shapes, and patterns, can help children recognize visual concepts in a more concrete and engaging way (Sulistyawati, 2024). Based on the observation results, some children still require more intensive stimulation to understand the relationships between colors, shapes, and visual details. Children who frequently color outside the outlines of pictures may demonstrate underdeveloped visual-motor coordination and spatial perception, particularly in estimating visual boundaries within an image. These abilities can be developed through engaging visual experiences that involve observing shapes, colors, and textures, as well as exploring spatial relationships directly. Repetitive activities involving color and shape

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recognition can also help children improve visual accuracy and develop their ability to distinguish objects in greater detail (Ducrot & Grainger, 2025).

Children's difficulties in distinguishing similar colors also indicate that their visual perception abilities are still developing. Visual perception refers to the brain's ability to receive, process, and distinguish visual information obtained through the sense of sight. Children aged 5–6 years generally require repeated learning experiences to develop their ability to recognize color variations, distinguish similar shades, and understand relationships between colors (Serino et al., 2024). Therefore, stimulation through visual media, such as Numberblocks animation, is important, because it provides concrete, engaging, and interactive learning experiences. The use of interactive visual media can help children gradually improve their ability to recognize colors, identify shapes and patterns, and develop visual-motor coordination (Newman et al., 2025).

Coloring activities are closely related to the development of children's cognitive and visual-spatial abilities. When children select colors, pay attention to image details, and attempt to color within the outlines, they practice visual observation, concentration, hand-eye coordination, and visual discrimination skills (Kiliç & Yorulmaz, 2023). Furthermore, color exploration activities, such as color mixing and visual arts, can enhance children's visual thinking abilities and deepen their understanding of color concepts. Therefore, the use of Numberblocks animation can serve as an effective learning medium for stimulating visual-spatial intelligence in early childhood, particularly when supported by teacher guidance, concrete learning materials, and consistent visual exercises (Ducrot & Grainger, 2025).

4. CONCLUSION

The findings indicate that following the use of *Numberblocks* animated films, 8 out of 10 children demonstrated optimal visual-spatial development, while the remaining 2 children showed progress toward the expected developmental level. The use of *Numberblocks* animation provided positive stimulation for the visual-spatial intelligence of children aged 5–6 years, particularly in recognizing geometric shapes, identifying colors, understanding patterns, and recognizing numerical symbols. These results suggest that animated visual presentations can support children's visual observation skills and hand-eye coordination. Therefore, *Numberblocks* animation can serve as an alternative learning medium for early childhood educators to support the development of children's visual-spatial intelligence.

This study has several limitations, including the relatively small number of research participants, consisting of only 10 children, which limits the generalizability of the findings to a broader population. Furthermore, the relatively short research period did not allow for an in-depth examination of children's visual-spatial development over an extended period. Future research is therefore recommended to involve a larger number of participants and a longer observation period to obtain more comprehensive and reliable findings. Further studies may also explore the use of other learning media, such as interactive games, *augmented reality*, and other educational digital media, to investigate additional factors that may influence children's visual-spatial development, including the family environment, learning approaches, and other developmental abilities.

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5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirm that this paper is free from plagiarism.

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