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Research Article

Animation-based learning model to stimulate drawing work in children aged 5-6 years

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An animation-based drawing learning model involves simple animation from the beginning to the end of the drawing, with the teacher acting as a facilitator and guide. The research is based on the fact that there are still many children who have difficulty expressing themselves through their drawings due to low imagination. The goal of this study is to develop a practical drawing learning model based on animation for children. 153 children aged 5-6 years participated in this study. An observation sheet was used to collect data on the shape and color of objects in children's drawings. Both qualitative and quantitative data analysis was utilized. The results revealed that limited trial, large scale trials, and wide-scale trials have a positive effect on children. The impact has been observed to exhibit a rising pattern. The results showed that the animation-based drawing learning model can be implemented in children 5-6 years old to stimulate drawing artworks.

Keywords: Animation-based drawing; Children's drawings; Drawing artworks; Early childhood

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1. Introduction

Children aged 5-6 years are the golden age, development during this period is very rapid (Diem-Wille, 2018). One of the learning concepts in kindergarten is playing while learning through fine arts. That is compatible with the concept of education through art (Cornaggia et al., 2022; Read, 1958). Children also learn to understand science or objects around them through visual artworks (Areljung et al., 2021; Lowenfeld & Brittain, 1964). Fine arts learning in kindergarten prioritizes the concept of creativity or making artwork (Mayar, 2022 Oliver-Barcelo et al., 2024). Children's art is a form of soul expression, also known as their visual language (Tabrani, 2014). In this case, children not only stimulate their creativity and fine arts skills but also develop a thorough understanding of the world around them through fine arts, especially drawing artworks.

In kindergarten, drawing activities are most often used because children prefer to draw (Mayar, 2021; Wiseman et al., 2019). For example, children use blank paper, books, and even walls to express their scribbled drawings using pencils, crayons, or colored pencils as a medium in their

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everyday lives. In other words, drawing is the process of making scratches on a surface with a pencil, pen, or crayon in order to describe the scratched or drawn lines.

Drawing artworks represent children's expressions and represent their visual language in form (Cetin & Gunes, 2021). The drawings produced by children are different from those of adults. The drawing artwork by children has its uniqueness. In other words, they have differences in theme, composition, color, symbols, emotions, and drawing techniques (Metin & Aral, 2020; Oztabak, 2020). The image objects and colors created are benchmarks for children's drawing expressions (Prayitno, 2021). The magnificence of children's drawing artworks cannot separated from the composition of the pictorial elements attached to the drawing. The drawing's elements (fine arts) are lines, shapes, colors, and textures (Salam et al., 2020). The composition of the image elements will determine the child's drawing type. Each child has their drawing type, which is different from other children.

Drawing activities had the advantage for children, including drawing being able to increase interpersonal intelligence by 85% in children (Pahrul et al., 2019), because early childhood is the golden age of drawing (Havigerová et al., 2021). That helps children communicate effectively with the person they are talking to. Drawing activities that have done together with other children in the class will form social-cognitive interactions (De Andrade et al., 2022). Drawing accompanied by a story can develop children's language skills (Hall, 2020; Prayitno, 2019). Drawing activities for children can help six aspects of children's development. These aspects are religious and moral values, physical motor, cognitive, language, and social-emotional (Imafuku & Seto, 2022; Ministry of Education [MoE], 2022; Poowanna et al., 2022; UNICEF, 2023; Zakaria et al., 2021). It is therefore important to optimize these in early childhood, especially in kindergarten. However, a study conducted by Achmad (2023) highlighted several problems of implementing drawing learning in kindergartens due to teachers' low abilities in drawing, unsupportive learning media, and low children's understanding of drawing concepts. These problems were also reported to affect children, including weak fine motor skills, low imagination skills, difficulty drawing basic shapes, and a lack of confidence in drawing doodles.

The urgency of this research is that children who have low imagination in simple drawing will have an impact on the child's low imagination or cognitive development. Children's cognitive development is one important aspect of child development. This impact appears when a child observes an object, it will be difficult to re-imagine it in the form of an image. Children will even be confused for a long time just to think about one object they are observing. Standardly, children aged 5-6 years can think or imagine simple things expressed in the form of symbols and pictures. This is because children aged 5-6 years have entered the preoperational cognitive development phase. Studies using animations as a tool for this development have reported significant cognitive improvements (Fan et al., 2022).

Animation is an image that can move or motion graphics, thus arousing children's interest in watching it. Animation can also be used as a form of e-learning for kindergarten children. Various studies suggest that the use of animation increases children's motivation to learn (Albayrak & Yilmaz, 2021; Fadhli et al., 2023; Majitol & Yunus, 2023; Pan et al., 2021). For example, a study conducted by Obalı and Ömeroğlu (2022) examined the effect of using animations on the phonological, visual-spatial, and semantic memory skills of preschool children. The results showed that the module supported by animations were effective in developing children's phonological, visual-spatial and semantic memory skills. It was also found that the effect was permanent. In their meta-analysis study, Egert et al. (2022) found higher effects for e-books that used animation, sound/music, or text tracking features, compared to e-books without such features. However, animation-based drawing learning models have not yet been discovered or applied to kindergarten children, even though animation can be used to support the learning of alpha generation children.

Today's kindergarteners are the alpha generation. Children born in 2010 (the year the iPad and Instagram were released) will be the last to be born to this generation until 2024 (Mc Crindle,

2021). An example of learning in the alpha generation is drawing collaboratively using iPad media (Sakr, 2019). Kindergarten children should be introduced to animation learning in today's technologically advanced world. This research aims to develop an animation-based drawing learning model for children aged 5-6 so that they can engage in drawing activities. Drawing learning is packaged with simple animated visuals to attract children's attention to watch and understand. Once the child understands, he or she is asked to create a drawing according to their own creativity. If there are children who do not understand this animated video, it can be played again. Drawing learning based on animation can be applied to kindergarten B or large kindergarten children to prepare them for the next level, namely elementary school.

2. Method

This research aims to develop the expressiveness of children aged 5-6 years. The model development in this research used the Borg and Gall method. Concretely, research is a systematic effort to answer research questions by collecting data and formulating findings based on that data. Development research basically develops research products and tests the product's effectiveness in achieving the objectives of the research (Borg & Gall, 2014).

Structured development procedures for research are needed, careful and structured development procedures help improve the quality of research and confidence in the results obtained (Zhou & Brown, 2017). The stages of developing this early childhood fine arts learning model go through 10 steps is as summarized in Figure 1.

Figure 1
Research Stages

The first step is needs analysis. This stage collects information, observes classes, conducts literature studies, examines problems that occur in kindergartens in Sleman Regency, Special

Region of Yogyakarta. The second step is to design a draft model development, the model that will be developed is fine arts learning. The third step is to develop a draft fine arts learning model, and carry out expert validation. The fourth step is to conduct a limited (small) trial with class teachers and 15 kindergarten children in Sleman Regency, Special Region of Yogyakarta. 5) The fifth step is to make improvements to the initial product produced based on the results of initial trials. This improvement is in accordance with the results shown in limited trials, resulting in a draft fine arts learning model that is ready to be tested more widely.

The sixth step is a large-scale trial, involving larger research subjects. This test involved 30 kindergarten children. The seventh step is to revise the fine arts learning model, based on instructions from large-scale trials. The eighth step is a wide-scale trial, this trial involved 93 kindergarten children. The ninth step is the revision of the results of wide-scale trials, these results are the basis of the final product. The tenth step is the final step, namely disseminating or disseminating the early childhood fine arts learning model to the general public. These steps aim to obtain research results as expected.

This research design consists of expert validation tests, small-scale trials, and large-scale trials. The validators in this study consisted of 1 fine arts education expert and 2 early childhood education experts. The small-scale trial involved 15 kindergarten children, and the large-scale trial involved 45 kindergarten children or children aged 5-6 years. This research was conducted from June to October 2023 in Sleman Regency.

Assessment instruments play an important role as tools used to systematically evaluate children's learning outcomes. This instrument is a means of measuring variables in early childhood fine arts learning in kindergarten. Instruments have measuring properties, they contain elements of questions or statements whose alternative answers have a certain standard answer, right-false, or answer scale (Sukmadinata, 2013). The instrument for assessing the expression of children's drawings is in the form of an observation sheet or assessment of children's fine art works. Table 1 illustrates the aspect for assessing the expression of drawings while Table 2 shows the instruments and categories of results for assessing the expression of kindergarten children's drawings.

Table 1
Aspect for assessing the expression of kindergarten children's drawings

Aspect	*Indicator*
Image Object Shape	The lines are firm
	The shape is clear
	There are details
Color	Variegated
	Matching colors
	Full coloring

Table 2
Assessment Result Category

Value	*Category*
86%-100%	Well-developed
76%-85%	Developed as expected
56%-75%	Started to develop
<55%	Less-developed

The data analysis presented in this study consists of both qualitative and simple quantitative techniques. Qualitative technical data analysis includes: 1) collecting verbal data from interviews, either written or verbal, on the model developed; 2) making transcriptions of written and spoken verbal data; 3) gathering, selecting and classifying written and spoken verbal data; 4) analyzing the data and analyzing the conclusions of the analysis as a basis for implementing follow-up plans on the learning model developed (Leavy, 2014). Simple quantitative techniques are used to analyze

quantitative data originating from questionnaires or model assessment questionnaires from experts, teachers, and observation questionnaires for assessing children's fine arts projects. Data in the form of numbers is used in this technical data analysis to measure the validity, practicality, and effectiveness of the fine arts project learning model in kindergarten. Appendix 1 shows the coding of a sample student drawing.

3. Results

An animation-based drawing learning model is a drawing learning model with the help of simple animations to help children learn drawing techniques that are easy to understand according to their age. This learning model aims to provide a fun learning experience for children. In this model, children will be introduced to various simple drawing techniques for children aged 5-6 years.

3.1. Needs Analysis

This research began with an analysis of the needs for drawing learning in kindergartens in Sleman Regency. The needs analysis at the start of the research involved 59 kindergarten teachers in the Sleman district area. The results of this needs analysis show that kindergarten teachers need an animation-based drawing learning model that is easy to implement. This is because animation can attract children's attention and help teachers who have limited drawing skills.

3.2. Design Model

Based on the results of the FGD and questionnaire to kindergarten teachers in Sleman Regency, the design of the drawing-based learning model to express the drawing work of children aged 5-6 years are: 1) presenting concrete media, 2) listening to the animation, 3) drawing basic shapes, while listening to the animation, 4) making detailed drawing objects , while listening to the animation, 5) thickening the lines with a marker, while listening to the animation, 6) coloring the image object, while listening to the animation, and 7) reflecting or telling the result of the work. Teachers as facilitators and guides. Teachers or parents can scan this QR code to apply this learning model. The QR code in this table is intended to scan and watch the animation. Table 3 contains 4 animations, including a fish drawing animation, a rocket drawing animation, a dragonfly drawing animation, and a strawberries drawing animation.

Table 3
List of Animated QR Codes

Animation	*QR Code*
	
	
	

Table 3 continued

Animation	*QR Code*
	

3.3. Expert Validation

This drawing-based learning model has been validated by model experts. Expert model validation aims to measure the validity of the animation-based drawing learning model for stimulating the expression of drawings for children aged 5-6 years. There are three experts in this model, consisting of one person from the scientific field of fine arts education, and two people from the scientific field of early childhood education. Validator one provided validation results of 92.5%, validator two provided validation results of 87.5%, and validator three provided validation results of 92.5%. The average of the three validation results is 90.83%, so it can be concluded that the animation-based drawing learning model for stimulating the expression of drawings for children aged 5-6 years is very valid to implement. Table 4 summarizes the results.

Table 4
Expert Model Validation Results

Validator Name	*Scientific Field*	*Score*
Validator 1	Fine Arts Education	92.5
Validator 2	Early childhood education programs	87.5
Validator 3	Early childhood education programs	92.5
Average		90.83

3.4. Limited Trials

The results of limited trials are based on children's drawings. The aspects of children's drawings that were observed were the shape of the drawing object and the color. Indicators of aspects of the shape of image objects include lines, shapes and details. Color aspect indicators include the number of colors (three or more), harmony, and fullness. The results of this trial were then adjusted to the criteria for the categories presented in Table 2. This small-scale trial was carried out on 15 kindergarten children aged 5-6 years. There were 15 children's drawings resulting from the trial of the animation-based drawing learning model. Among these results, there were 7 children who were well-developed, 4 children who were developed as expected, 4 children who were starting to develop, and no children who were less-developed.

3.5. Large-Scale Trials

A large-scale trial was carried out on 45 kindergarten children aged 5-6 years, there were 45 children's drawings resulting from the trial of the animation-based drawing learning model. The findings encompass the classifications of 23 children who displayed well-developed skills, 9 children who exhibited the expected development, 12 children who showed initial signs of progress, and 1 child who demonstrated lower levels of development.

3.6. Wide-Scale Trials

This wide-scale trial measures the impact on the expression of the drawings produced by the child, whether there is an increase or decrease from the previous trial. A wide-scale trial of research into animation-based drawing learning models involved 93 children aged 5-6 years. The results

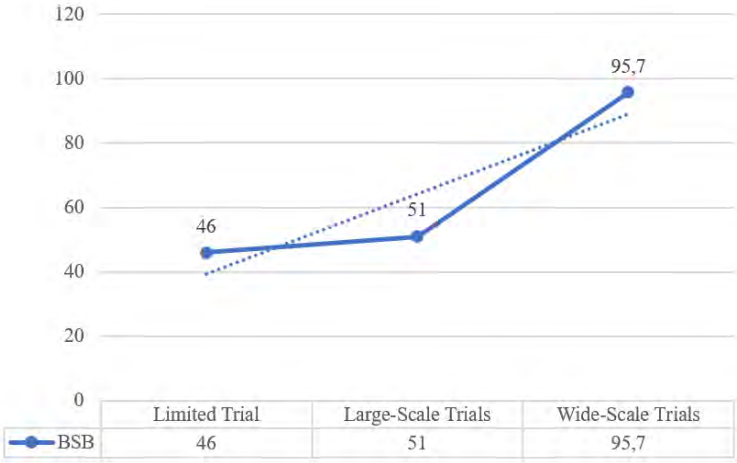
showed 89 well-developed children, 4 children with expected development and no under other categories. Table 5 shows the summary of overall results.

Table 5
Percentages of overall results in each trial

	Limited trials	*Large-scale trials*	*Wide-Scale trials*
Well-developed	46	51	96
Developed as expected	27	20	4
Started to develop	27	27	-
Less-developed	-	2	-

Although change was not examined with parametric (or non-parametric) tests in the present study, descriptive analyses showed that limited trial, large scale trials, and wide-scale trials have an impact on children. This impact has an increasing trend, children who are categorized as well-developed children from limited scale tests to wide scale trial, as shown in Figure 4.

Figure 4
The Impact of Models on Children



As can be seen from the Figure 4, the animation-based drawing learning model has shown positive results. In other words, using the animation-based drawing learning model improved children's learning experiences and helped them develop optimally.

4. Discussion

Children aged 5-6 years are the golden age of children. Children will lose a lot if they are not optimized with positive activities, why? Because a child's brain at the age of 0-8 years has a very high capacity to absorb information, namely 70% (Falvell & Piaget, 1963). An animation-based drawing learning model to stimulate the expression of drawings for children aged 5-6 years, in accordance with current developments, namely the digital era or alpha generation. The alpha generation is the generation that has been familiar with digital technology since birth (Omar et al., 2021; Rusman et al., 2019). Kindergarten children currently belong to the alpha generation. Expression of drawings by children aged 5-6 years is a means of getting to know the life of the surrounding environment. This is in accordance with the theory of pre-operational cognitive development (Murphy, 2022; Piaget, 1929), that children know the world through symbols, colors and signs. Drawings are representations of symbols, colors and signs.

As a result of implementing the animation-based drawing learning model in kindergarten, children can understand how to recognize objects from their color, shape, size and characteristics according to what they see. The main achievement of all this is that children can express drawings. This is in accordance with the Montessori theory that children must be taught something concrete, not wild fantasies (Hong et al., 2021; Kuperman et al., 2022; Montessori, 1912). This theory is also

in line with the theory of visual image types. The type of visual image is a type of image that is based on observations according to what is experienced, in other words according to real objects around us. This child's drawing is a symbolic representation of a child's expression (Cunningham, 2022; Rosen et al., 2020). Each child's drawing has its own meaning, we can understand this drawing by having a dialogue with the child (Podobnik et al., 2024).

An animation-based drawing learning model can also help aspects of children's development, which helps achieve government programs such as aspects of the development of religious and moral values, Pancasila values, cognitive, physical motor, language and social emotional (Purwoko et al., 2019). This animation-based drawing learning model is also in line with the newly implemented Merdeka Curriculum. In this curriculum there are learning outcomes for children to be able to express ideas through works of art (MoE, 2022). Creating images is one example of the artistic expression in question. Animation-based drawing learning can also be used as a children's art project, this learning can be packaged with online art project learning (Lai, 2021). Drawing activities for children have the potential to develop one of the STEAM (Science, Technology, Engineering, Art, and Mathematics) skills (Hawari & Noor, 2020; Lowe & Mason, 2017).

Animation is an effective medium for increasing enthusiasm for learning in children. Several studies have highlighted the positive impact of using animation as a teaching tool on students' interest, motivation, and learning outcomes (Baglama et al., 2018; Hanifah et al., 2023; Pratiwi & Rofii, 2023). Overall, the research findings support the integration of animation as an effective tool in teaching, emphasizing its role in capturing students' interest, stimulating their imagination, and creating a positive learning environment. Animation-based drawing supports learning in the alpha generation.

This research has limitations in making the number of animated videos. This is because time is limited. Another limitation is that not all kindergarten schools have equipment that supports implementing this animation-based drawing learning model. The availability of resources and technical support might pose challenges for the widespread implementation of this animation-based drawing learning model across all kindergarten schools. Limited access to necessary tools, such as computers, software, or internet connectivity, could hinder the effective adoption of the program in certain educational settings. Furthermore, variations in the level of technological proficiency among educators and students might affect the seamless integration of animated videos into the curriculum. Teachers may require training and support to effectively utilize these resources, and students may need guidance to navigate and engage with the animated learning materials.

5. Conclusion

Animation-based drawing learning is a drawing learning model that is suitable and appropriate for the current generation. This lesson helps stimulate children aged 5-6 years in expressing drawings and introducing them to the surrounding environment through drawings. This animation helps kindergarten teachers apply drawing lessons to their students. The suggestion from this research is that in every kindergarten, there should be facilities such as audio-visual rooms or classrooms integrated with audio-visual equipment. This is to support the implementation of the animation-based drawing learning model.

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Data availability: The data supporting the findings of this study are available upon request. Interested researchers may contact the corresponding author for access to the data.

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Appendix 1. Sample student drawings and coding examples

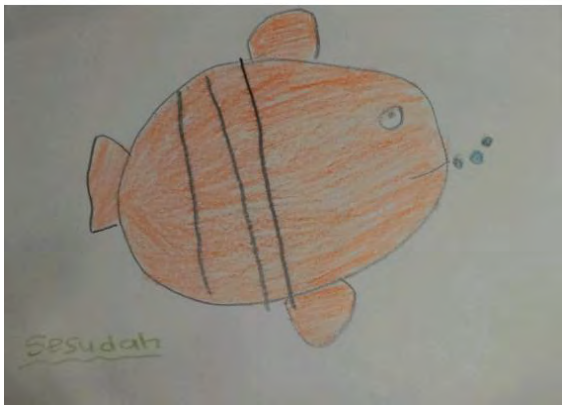
First example

This drawing work was made by a 6-year-old girl. The results of the analysis showed that the lines were made spontaneously, the shapes drawn resembled fish. This drawing work has details such as eyes, fins, tail, mouth, and body. This work uses more than one type of color, and the color display is full without any blank fields. Based on these assessment and analysis instruments, this drawing work is included in the category of *developed as expected*.

Second example

This drawing resembled the shape of a fish, made by a 6-year-old girl or a large kindergarten class. The results of the analysis showed that the lines made were consistent, the shape of the fish was clear. This drawing also has complete details including eyes, fins, tail, mouth, and body. This work uses varied colors, and the color display is full with no blank fields. Based on this analysis and in accordance with the assessment instrument, this drawing work is included in the *well-developed*.

Third example



This fish drawing work was made by a 5.5-year-old boy or a large kindergarten class. The results of the analysis showed that the lines made looked spontaneous and consistent, the shapes drawn resembled fish. This drawing work has details such as eyes, fins, tail, mouth, and body. This work uses more than one type of color, and the color display is full without any blank fields. Based on these assessment and analysis instruments, this drawing work is included in the *well-developed*.

Fourth example

This drawing work was made by a 6-year-old boy or a large kindergarten class. The results of the analysis showed that the lines made were consistent and spontaneous, the shapes drawn resembled strawberrie. This drawing work has good details such as the stalk, petals, fruit core, and the texture of the dots on the fruit body. This work uses more than one type of color, and the color display is full without any blank fields. Based on these assessment and analysis instruments, this drawing work is included in the category of *developed as expected*.

Appendix 1 continued

Fifth example

This drawing work resembles a strawberry object. This work was created by a 6-year-old boy or a large kindergarten class. The results of the analysis showed that the lines made were consistent and spontaneous, the shapes drawn resembled strawberries. This drawing work has good details such as the stalk, petals, fruit core, and the texture of the dots on the fruit body. This work uses more than one type of color, and the color display is full without any blank fields. Based on these assessment and analysis instruments, this drawing work is included in the *well-developed*.