Section of the conference: Social Sciences | Sekcja konferencji: Nauki społeczne

How to cite: Miaomiao, X., Mutalib, A. A., & Hamzah, H. I. (2024). Exploring Video Modeling for Enhancing Drawing Skills for Children with Autism. *World conference on future innovations and sustainable solutions*. Futurity Research Publishing. https://doi.org/10.5281/zenodo.14580488

Exploring Video Modeling for Enhancing Drawing Skills for Children with Autism

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Accepted: October 24, 2024 | **Published**: November 1, 2024 | **Language:** English

Abstract: This study aims to investigate the effectiveness of video modeling in enhancing drawing skills among children with Autism Spectrum Disorder (ASD). A controlled experimental observation was conducted with 10 ASD children aged 9-11 at a special education school in China. The findings suggest that video modeling is beneficial for most ASD students in learning to draw.However, challenges remain in areas such as video manipulation and color application. The results offer practical recommendations for improving art education for children with ASD, highlighting their significance in the field.

Keywords: video modeling, drawing skills, special education, learning experience.

Introduction

Given the dramatic increase in the number of students with ASD (Miaomiao, Ariffin, & Hammuzamer,2024), it has become particularly crucial to assist them in their learning and enhance their overall well-being. Numerous studies have shown that video-based learning, especially video modelling, can assist teachers and families in better coping with ASD students (e.g., behavioural interventions) and also enhance the well-being and daily functioning of ASD students, including communication, social, language and problem-solving skills (Piraneh et al., 2023; Yakubova et al., 2020; Asadi et al., 2022; Alkinj et al., 2022).

In summary, current educational approaches for ASD children primarily focus on behavioral interventions, language training, and the development of social skills. However, there are still limitations in the area of art education, particularly in the cultivation of drawing skills.Multiple studies indicated that students with ASD encounter difficulties in drawing learning (Jones, Hanley, & Riby, 2020; Shi, Sun, Duan, Liu, Hu, Wang, & Zhai, 2021).These difficulties may ultimately impact the future development of students in areas such as academic performance and cognitive abilities.

A study has demonstrated that video modeling assisted learning (VMAL) by providing a visual demonstration with clear and consistent language to guide skill acquisition (Hughes, & Yakubova, 2019).Additionally, VMAL also allows for repeated playback, which helps reinforce learning in a familiar environment, enabling ASD students to gradually master new skills (Piraneh et al., 2023; Yakubova et al., 2020; Asadi et al., 2022; Alkinj et al., 2022).Generally, VMAL materials designed for ASD students should meet key learning requirements to capture and maintain their attention throughout the learning process (Ho et al., 2019; Yalçın et al., 2023). This implies that VMAL materials should be crafted to provide an engaging and positive user experience.

Although previous research has explored the learning characteristics of ASD studnets and the application of VMAL in special education, studies that specifically combine video modeling with the teaching of drawing skills remain limited. The uniqueness of this study lies in its introduction of video modeling into the art instruction of ASD students, aiming to assess the effectiveness of this approach in teaching drawing skills. By addressing this gap in the literature, the study provides educators in the field of special education with practical guidance and theoretical insights. he introduction needs to relate to the problems or issues being recognised and eventually leading the research questions. The structuring of the introduction part may vary.

Research Methodology

This study was conducted through controlled experimental observation.Controlled observation aims to identify potential issues that users might encounter when interacting with a system, product, or service (Jordan, 2000). It involves guiding activities through strict controls, such as task sequencing, to minimize noise in the data and reduce the potential impact of knowledge transfer between tasks, thereby avoiding repetitive actions. When using controlled observation, it is recommended to record the time participants take to complete each task, ensure a controlled environment free from noise and visual distractions, and, if possible, observe users in a suitable laboratory setting (Valencia, Rusu,

Botella & Jamet, 2022).In this study, all experiments were conducted in an art classroom within a special education school. Table 1 listed the descriptions about experiment procedure, apparatus, and techniques of logging.During the experiment, participants were first given a brief introduction to the study's purpose, including a reminder of their anonymity and the option to leave at any time. Afterward, participants were provided with materials such as iPads, paper, and mark pens. Each student watched a video of a drawing lesson and attempted to replicate the drawing. The observers recorded the students' learning experiences, including their language and behavior, through photographs and notes. Subsequently, the students' works were collected and analyzed comprehensively.

Table 1

Summary of procedure, apparatus, and techniques of the test

Experiment Procedure	Appointment: Fixed before the experiment Control: To minimize bias, each participant in the test alone present at the testing site. Each test session took about 10–30 minutes. Flow of the experiment: As shown in Figure 3.7, each student individually watched the video.Then an observer observed and recorded the student's behavior and facial expressions through notes and photos.
Apparatus	Each experiment with one person lasts for 10-30 minutes, depending on whether the participants complete the drawing or not. Learning material:Baby Bus Magic Brush Mark pens, white papers, iPad.
Techniques of logging	An observer recored the facial experission and behavior by taking notes and photos.

According to Creswell (1998), a sample size of 5 to 25 participants is typically required to adequately address a phenomenon. Heary & Hennessy (2002) suggested that having more than 8 children or fewer than 4 could impede effective discussion. Recent studies involving small-sample experiments with ASD students support these perspectives (Bozkurt, Say, Şahin, Usta, Kalyoncu, Kocak, & Osmanlı, 2022 ; Kadam, Soni, Kadam,Pandit, & Patole, 2022;Bergmann ,Camatta,Birkner & Sappok,2021).

Therefore, this study selected 10 ASD students with a disability level of 2 or higher from a special education school in Zhejiang Province, China, as research participants. The sample consisted of 10 ASD children aged 9-11, including 2 girls and 8 boys. Given the students' levels of disability and drawing abilities, this study employed purposive sampling. Purposive sampling involves selecting participants based on the specific needs of the research (Taherdoost, 2016; Mohamad & Hashim, 2021), and it is a common method for identifying appropriate participants. All students met the following criteria:

i)The students must have been diagnosed with ASD at a reputable tertiary hospital,with a disability level of 2 or higher.

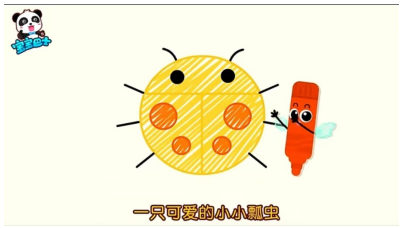
ii)The students must be between the ages of 9 and 11 and currently enrolled in the third grade.

iii)The students must possess sufficient physical and cognitive abilities, such as the ability to imitate drawing content.

The drawing learning material used in this study was selected from an educational animation—BabyBus: Magic Brush, specifically focusing on drawing a ladybug, as shown in Figure 1. The specific content and theme of the drawing are not the primary focus of this study. Therefore the learning content not be discussed in detail.

Figure 1

The Drawing Content



Research Results

Data collection in this study was conducted in two parts: First, the students' learning experiences during the drawing process were collected through photos and notes, capturing details such as facial expressions, language, and behavior. Second, the usefulness of VMAL for ASD students was analyzed through their completed works.

The learning experiences of ASD students during the drawing process was elaborated in the following sections. As shown in Figures 2, the students were highly focused while watching the video. Figure 3 depicted a student sharing their drawing with the teacher, smiling as they say "ladybug."

Figure 2

Samples of Subjects Focused When the Video Modeling Part Started

Figure 3

Sample of Subjects who Expressed their Enjoyment at the Video Modeling Section

Additional learning experiences are detailed in Table 2. From the table, it can be observed that five students did not know how to interact with the video. And some ASD children need assistance from the researcher to complete their drawings, as they would get distracted and were unable to maintain focus on their artwork. These students needed reminders from the observer to continue with their drawing.However, most students displayed varying degrees of positive learning experiences with the video,such as a student gently shook his head, appearing very relaxed; a student held up his drawing and said to the teacher, "I'm done! I want to draw more.";After complete the ladybug, he choosed a new drawing lesson to contine drawing.

Table 2

Samples of Learning Experiences When Exploring the Video

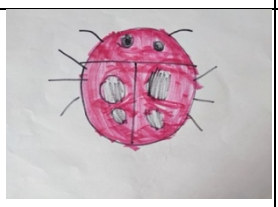
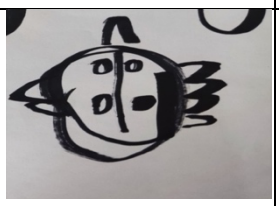
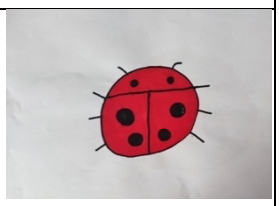
Student Code	Learning Experiences
1	During the drawing process, the student exhibited emotional difficulties and was unwilling to mimic the ladybug drawing. Additionally, she modified the ladybug's antennae and repeatedly watched the coloring segment of the video. The student demonstrated proficiency in operating the tablet and interacted with the video, such as by dragging the progress bar to replay coloring sections.
2	After complete the ladybug, he choosed a new drawing lesson to contine drawing.
3	The student shared his drawing with the researcher, smiling and said "ladybug." However, he did not know how to interact with the video and need the researcher's help to clik replay button.
4	The student drew the ladybug at a very slowly pace and very focused. However, he did not know how to drag the progress bar and need the researcher's assistance.
5	While coloring the ladybug, the student gently shook their head, very relaxed.
6	While drawing the shape of the ladybug, the student furrowed his brow, displaying signs of confusion or uncertainty. He did not know how to click replay or pause button.
7	While watching the opening section of the animation, the student spontaneously leaned forward towards the screen, demonstrating a high level of interest in the video.

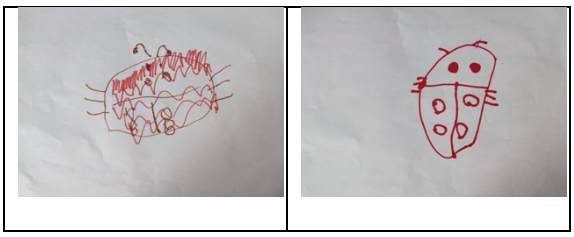
8	After finishing coloring the ladybug, the student held up his drawing and said to the researcher, "I'm done! I want to draw more."
9	The student did not know how to color correctly and was unable to interact with the video, such as by clicking replay or pause.
10	The student was unwilling to color the ladybug and stared at the video blankly during the coloring segment. He did not know how to interact with the video, such as by clicking replay or pause.

On the other hand, the experiment found that most ASD students were able to draw a ladybug following the video demonstration. Table 3 presents the students' works. The video was 2 minutes and 56 seconds long. 7 students were able to complete their drawings within 5 minutes. However, 3 students were unable to finish the coloring stage. Therefore, the video was helpful for most ASD children in learning to draw.

Table 3

The ASD Studnets' Works

Student 1	Student 2	Student 3	Student 4
Drawing Duration: 8 minutes	Drawing Duration: 3 minutes	Drawing Duration :3 minutes	Drawing Duration:22minutes
			
Student 5	Student 6	Student 7	Student 8
Drawing Duration :7 minutes	Drawing Duration :3 minutes	Drawing Duration :4 minutes	Drawing Duration :4 minutes
			
Student 9	Student 10		
Drawing Duration :4 minutes	Drawing Duration :3 minutes		



Additionally, three main issues were identified in the VMAL process for ASD children: First, nearly half of the students were unable to pause or rewind the video during the drawing process. Second, more than half of the children with ASD were able to draw the shape of the ladybug, although some of the shapes of the ladybugs were disproportionate.Lastly, over half of the children had difficulties with coloring, such as failing to color within the lines, and in some cases, not knowing how to color the object at all.

Therefore, when using video modeling for teaching, especially with mobile devices, it is essential to first teach students how to use the device. In addition, drawing exercises should focus on improving ASD children's ability to depict shapes and apply colors. When training children in coloring, teachers can guide them through specific coloring exercises for uncolored objects. In terms of proportion training, teachers can encourage ASD children to use short lines to outline the size and proportions of the object before starting to draw, helping them develop a better sense of scale. Furthermore, teachers could incorporate object observation lessons to help children better understand the characteristics of objects.

Conclusions

The study's findings indicate that VMAL is helpful for ASD students in learning drawing skills, as evidenced by their ability to replicate the content demonstrated in the instructional video. However, the research also uncovered significant challenges faced by ASD students during the learning process. A considerable number of participants were unable to interact effectively with the video, such as pausing or rewinding it. While most students were able to draw the basic shape of the object (e.g., the ladybug) and apply color, some encountered difficulties with shape accuracy and color application, highlighting the need for more targeted training in these areas. These findings indicate the necessity of further refining video modeling materials to better address the specific learning needs of ASD students.

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