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Animated Video-Based Learning Media for Teaching Science to Children with Autism: A Case Study at SLB C, Autis Negeri Kedungkandang, Malang

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Abstract

Children with autism have impairments in their neurological system, which affect the development of both verbal and non-verbal communication and subsequently impact the learning methods applied to them. This poses a challenge for schools and teachers in providing appropriate methods. Learning must be provided to all children, including science, which requires complex understanding. Therefore, determining learning media or methods for science requires well-structured material division that adapts to the characteristics of children with autism so that learning can proceed optimally. The purpose of this study is to determine the application of animated video media in science learning for children with autism. This study uses a qualitative approach with a case study type, employing participant observation and interviews as data collection techniques. The subjects of this study consist of two teachers, selected using purposive sampling. The results of the study indicate that the application of animated video media in science learning for children with autism is able to increase children's interest in learning due to the combination and variation of colors, sounds, and images. Nevertheless, teachers also assessed that the application of animated video media would be more effective when taking into account the conditions and characteristics of each child with autism.

Keywords: animated video; science learning; children with autism

1. Introduction

Children with autism spectrum disorder (ASD) have difficulties with behavior, communication, and social interaction. They tend to prefer playing alone, engage in repetitive activities or movements such as hand flapping, exhibit uncoordinated behaviors like pacing back and forth, and have difficulty maintaining focus on a single task (Lutfianti et al., 2025). Children with autism or Autism Spectrum Disorder (ASD) are those who experience neurological impairments during their developmental years before reaching the age of 3, which affects both verbal and nonverbal communication development, impacts social interaction, and results in a lack of flexibility in the child's thinking (Mundy et al., 1997; Gargiulo et al., 2021; Prayogo et al., 2023). According to research by Ismail et al. (2025), students with ASD often experience difficulties in initiating and ending a conversation, responding appropriately during a conversation, or understanding the purpose of communication. According to Edyyul et al. (2024) in the study by Lutfianti et al. (2025), individuals with autism face barriers in communication and social interaction, such as difficulty forming relationships with others, limitations in the use of nonverbal behaviors like eye contact and facial expressions, and challenges in language skills. This can affect social interactions and the learning process in the classroom (Ismail et al., 2025).

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Certain subjects are necessary and important for all students, including children with autism; one of these is science. Science is the discipline that systematically studies the facts and concepts of nature (Fajrie & Masfuah, 2018). Permendiknas 2006 also states that science leads to learning that emphasizes the inquiry or discovery process, aimed at developing the ability to think, work, and act scientifically, as well as problem-solving skills that begin with observation, hypothesis formation, measurement, classification, communication, and drawing conclusions (Fajrie & Masfuah, 2018). Complex learning requires the material to be divided appropriately and organized so that students can understand it well. The characteristics of children with autism present a challenge for teachers in providing appropriate learning materials, media, and methods for these students. Given the nature of children with autism, there is a need for a variety of learning media that can assist during the learning process. This aligns with research conducted by Ismail et al. (2025), hich found that children with autism often struggle to understand information presented in conventional learning formats, especially when material is delivered solely as static text without engaging visual elements. Therefore, according to Utami et al. (2023) as cited in Ismail et al. (2025) the use of video media can improve understanding. This is also supported by research Sae & Radia (2023), showing that animated videos can spark interest and encourage students to think critically. Children with autism tend to find it easier to understand information conveyed through visual media because it is simpler to access and process (Fardani & Sayatman, 2020; Rafikayati et al., 2022).

Based on previous research, this study describes teachers' perceptions of the use of animated videos in teaching science concepts to children with autism at the Kedungkandang State Special School for Autism (SLB C Autis) in Malang. The results of this study are expected to contribute to the development of more innovative adaptive teaching practices that are responsive to the needs of children with special needs, particularly those with autism.

2. Method

2.1. Type of Research

This study employs a qualitative approach using a case study design. Qualitative research is a method used to investigate the natural conditions of the research subject, in which the researcher serves as the key instrument, data collection techniques are triangulated (combined), data analysis is inductive, and the results of qualitative research emphasize meaning over generalization (Suriani et al., 2023). This study aims to provide an in-depth description of the use of animated video media in science instruction for children with autism from the teachers' perspective.

2.2. Time and Location of the Study

This study was conducted in May 2026 at SLB C, the Kedungkandang State School for Children with Autism, in Malang.

2.3. Research Objectives

The objective of this study is to determine the implementation of animated video media in science instruction for children with autism, based on the experiences and perspectives of teachers who have directly applied it in the classroom.

2.4. Research Subjects

The subjects in this study were two teachers at the Kedungkandang State Special School C for Children with Autism in Malang, selected using purposive sampling. Purposive sampling is a technique within nonprobability sampling used in qualitative research to determine a sample of data sources. Sugiyono (2015) as cited in Suriani et al. (2023), defines purposive sampling as the selection of data sources based on specific considerations. The criteria for selecting subjects in this study are as follows: (1) teachers who use animated video learning media in science instruction; (2) teachers who teach at a Special Education School (SLB) for children with autism; (3) teachers who have been teaching for at least 1 year; and (4) teachers who are willing to participate and be interviewed.

2.5. Data Collection Methods

Data collection in this study was conducted through interviews with the teachers involved, with the aim of obtaining data on the use of animated video media in science instruction for children with autism.

2.6. Data Analysis Techniques

The data analysis technique used in this study was qualitative descriptive analysis based on the interactive model by Miles and Huberman, which includes data reduction, data presentation, and drawing conclusions (Qomaruddin & Sa'diyah, 2024). The stages of data analysis conducted include:

2.6.1 Data collection: Data were obtained from interviews with two teachers at the Kedungkandang State Special Education School for Autistic Children (SLB C Autis) in Malang.

2.6.2 Data reduction: The interview data were summarized, selected, and focused on the relevant key points.

2.6.3 Data presentation: The reduced data were presented in the form of descriptive narratives.

2.6.4 Drawing conclusions: The researcher drew conclusions based on the results of the data analysis.

3. Results and Discussion

3.1 Result

3.1.1 Alignment of Media with Student Characteristics

Teachers instructing students with autism in grades 1, 2, and 6 have implemented the use of animated video media. For students with autism in grades 1 and 6, classroom learning was quite conducive because the students' characteristics generally fell into the mild to moderate categories, whereas in grade 2, the students generally fell into the severe autism category. Teachers have actively used animated

video media in the classroom for religious education (grades 1, 2, and 6), IPAS (specifically for grade 6), and other subjects. The animated videos used typically come from YouTube and generally meet certain criteria, such as the inclusion of visuals of people and objects relevant to the subject matter, as well as audio. The videos are tailored to the characteristics of children with autism, who have difficulty maintaining focus for long periods, so the selected videos are short, with a maximum duration of just 1 minute. Teachers use them in several subjects, one of which is IPAS in 6th grade, such as when teaching about liquids and solids. Teachers demonstrate the properties of liquids and solids using animated videos.

The responses of students in grades 1 and 6 taught by BE showed that some focused more on the audio than on the visual images; however, if the video was considered engaging, the students were able to maintain their focus on watching it for a considerable amount of time. For second-grade students taught by BF and BE, it was quite difficult to use video media because it required a laptop, and given that these students have severe autism, using video as a learning tool presented significant challenges. This was because the second-grade students exhibited severe symptoms, including aggressive behaviors such as throwing objects, making the use of animated videos less effective. To address this, the teachers opted to use flashcards or illustrated images instead.

3.1.2 The Appeal of Animated Video Media

Animated video media emphasizes moving images (visuals) and sound (audio). Some students are typically more easily drawn in by videos that use striking colors, so teachers should take this into account when selecting videos. Videos are more engaging for children when they are played at a slow pace; if the pace is too fast, students may not be able to fully grasp the content. Videos that are too fast will actually make it difficult for students to grasp the meaning of the lesson being presented..

3.1.3 Changes in Student Behavior

Animated video media are considered helpful to teachers in the process of delivering science lessons because the colorful, illustrated videos can engage students in learning. The behaviors observed in some students include improved understanding; for example, students were able to recall lessons taught the previous week. Students can recall the videos shown by the teacher. Students also actively respond to the teacher when the teacher uses animated video media.

Animated videos are used in combination with flashcards, because videos are constantly in motion, so teachers need additional teaching aids to maximize children's learning. The videos are also shown twice: first to view the entire video, and a second time so they can be paused, giving the teacher time to explain. Animated videos are considered helpful for the IPAS learning process because the material requires examples, such as the concepts of liquids and solids. Teachers use videos for the introductory material, followed by hands-on practice.

3.2 Discussion

3.2.1 Alignment of Media with Student Characteristics

The use of animated videos in this study indicates that the effectiveness of animated video media for students with autism at the Kedungkandang State Special School for Autism (SLB C Autis) depends heavily on the students' individual characteristics, particularly the severity of their autism spectrum disorder. For students in grades 1 and 6 with mild to moderate autism, the use of animated videos was quite effective, whereas for students in grade 2 with severe autism, the use of this medium was less effective and triggered aggressive behaviors such as throwing objects. This is consistent with the opinion expressed by Maharani & Nadhirah (2024) that children with autism may exhibit aggressive behavior, self-harm, have tantrums, have difficulty maintaining concentration, and engage in repetitive behaviors.

The varying characteristics of children with autism indicate that animated video media can be used depending on the category to which the child with autism belongs. This also explains why first- and sixth-grade students in this observation exhibited more conducive learning conditions when taught through videos, as the severity of their autism falls within the range that Fitrisani & Ainin (2025) identified as responsive to video-based interventions. Conversely, the difficulty in applying video media to second-grade students classified as having severe autism can be explained by the characteristics of children with autism described by Maharani & Nadhirah (2024).

Children with autism exhibit a wide range of symptoms, including cognitive impairments, motor and behavioral disturbances such as stereotypical behaviors, hypersensitivity to sensory stimuli, and behaviors that may pose a risk to themselves or their surroundings. The more severe a child's autism is, the greater the tendency for aimless and uncontrollable behavior to emerge, as illustrated by the behavior of throwing objects observed in second-grade students in this study. This condition makes screen-based media, such as animated videos, less than optimal for use without further adaptation.

The teacher's decision to switch to using flashcards or picture-based materials for students with severe autism is also consistent with the intervention principles outlined by Armanila et al. (2023). In their study, they emphasize that interventions for children with autism must be tailored to each child's individual characteristics, including avoiding long sentences during instruction, minimizing noise or loud sounds that may disrupt the child's concentration, and providing intensive supervision throughout the learning process. Armanila et al. (2023) also emphasize the importance of teachers exercising extra patience and providing a variety of learning materials, as not all learning media are suitable for every child with autism. This principle appears to have been applied by the teacher in this study, specifically by replacing video media with flashcards for students with severe

autism to continue learning without triggering aggressive behavior caused by excessive visual and auditory stimuli from screens.

Furthermore, the teachers' choice of short video durations—no more than one minute—in this observation is supported by the findings of Fitrisani & Ainin (2025) regarding the limited working memory of children on the autism spectrum. A consistent, brief, and repeatable video structure is considered important so that children with autism are not overwhelmed when processing information, in line with the needs of children with autism, who tend to find it easier to understand concrete and simple information than complex information.

3.2.2 The Appeal of Animated Video Media

The interest shown by autistic students in animated videos with vivid colors and a slow pace, as observed in this study, actually reflects how the sensory systems of autistic children process information. The bold, striking colors serve as an initial attraction that captures the child's visual attention, while the slow pace gives them space to truly process the meaning behind each scene shown, rather than simply glancing at it and moving on. When the video's pace is accelerated, the result is not more efficient understanding but rather confusion, as the brains of children with autism generally require more time to process visual and auditory stimuli simultaneously.

Sari et al. (2024) described animated videos as essentially a combination of text, images, colors, and audio designed to work together to transform abstract concepts into something that learners can more easily visualize. In the assessment instrument they developed, the appropriateness of color composition is one of the criteria for evaluating the suitability of an educational video, consistent with the observed preference of students with autism for striking visual displays. This means that the principles of good video design from a general educational perspective are also relevant in the context of teaching children with special needs, albeit with a more specific emphasis.

However, the need for a slow pace among children with autism has a deeper explanation than mere visual preference. Fitrisani & Ainin (2025) reveal that children on the autism spectrum have limitations in working memory, so they require a consistent and repeatable video structure to ensure that the information they receive does not overwhelm their processing capacity. Fast-paced videos essentially pack a lot of information into a short period of time—a situation that actually overwhelms children with autism rather than helping them. The slower and more methodically a video is presented, the greater the chance that a child will be able to follow the storyline or instructions contained within it without feeling overwhelmed.

3.2.3 Changes in Student Behavior

The students' ability to recall material presented through animated videos the previous week indicates that this medium not only captures their attention

momentarily but also leaves a fairly strong impression on them. The students' active responses when the teacher showed the animated videos further indicate that this medium successfully fosters more dynamic engagement in learning compared to conventional methods.

findings regarding the effectiveness of visual elements and color in capturing students' attention align with the results of a community service project by Astutik et al. (2022), who developed Kinemaster-based animated videos featuring vibrant visuals and easily understandable stories for children with autism and speech impairments. Through that study, the videos designed with visually appealing elements, were well-received by the students and deemed highly practical by the accompanying teachers, a pattern similar to the enthusiasm and active responses observed among students during the science lessons in this study. This similarity demonstrates that the principles of designing visually engaging animated videos apply across contexts, whether for Islamic studies or science education.

The teacher's decision to combine animated videos with flashcards also reflects an understanding that videos, no matter how engaging they may be, have limitations due to their constantly moving nature and inability to present information statically for learners to reflect on for a longer period. The need for this supplementary medium is also consistent with the findings of Astutik et al. (2022) ho emphasize the importance of designing learning media creatively and innovatively so that it truly suits each child's individual needs, rather than relying solely on a single type of medium. In other words, animated videos are best used not as a standalone medium, but as part of a combination of complementary media.

The teacher's strategy of showing the video twice, once in its entirety and once with pauses to provide additional explanations also demonstrates an important technical adaptation in learning. This approach essentially allows the teacher to bridge the gap between fast-paced visual content and students' need for more detailed and gradual explanations. This practice aligns with the principles identified by Sari et al. (2024) in the development of animated IPAS instructional videos, in which the duration and pace of the video are among the crucial aspects that determine the extent to which students can fully understand the material.

4. Conclusion

Overall, the findings of this observational study reinforce the view that the effectiveness of animated video media for children with autism is not absolute but is strongly influenced by the severity of autism as well as each child's sensory and behavioral characteristics. Teachers are required to be flexible in selecting and combining learning media ranging from animated videos for children with mild to moderate autism to alternative media such as flashcards for children with severe autism as a way to adapt learning strategies centered on the individual needs of students.

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