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[Original Research]

The Influence of Audiovisual Media Education on Primary School Children's Knowledge and Attitudes Toward Dental Caries

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Abstract

Background: Dental caries is a common dental health problem in children and can cause pain, infection, and tooth loss. This condition can negatively impact quality of life by reducing self-confidence, interfering with eating, speaking, learning, and social interactions. One crucial factor in caries prevention is children's knowledge and attitudes about oral health. Sufficient knowledge helps form positive behaviors, such as maintaining oral hygiene and visiting the dentist regularly. Audiovisual education is effective because it presents information in a visual and auditory format that is engaging and easier for children to understand. **Objective:** to determine the effect of education using audiovisual media on the knowledge and attitudes of student primary school about dental caries. **Method:** This study used a pre-experimental method with a one-group pre-test and post-test design. The research was conducted at SD Plus Darussurur Al-Yahya, involving 45 students from grades I to III, selected through stratified random sampling. Data collection was carried out using a structured questionnaire as the primary research instrument to measure students' knowledge and attitudes regarding dental caries before and after the audiovisual educational intervention. **Results:** The results showed a statistically significant improvement in both knowledge and attitudes. Good knowledge increased from 35.6% to 73.3%, sufficient knowledge decreased from 33.3% to 26.7%, and no students had poor knowledge after education. Positive attitudes rose from 51.1% to 66.7%, while negative attitudes declined from 48.9% to 33.3%. Statistical analysis using the Marginal Homogeneity test ($p = 0.001$) for knowledge and the McNemar test ($p = 0.039$) for attitudes confirmed that these changes were statistically significant. **Conclusion:** Audiovisual education potentially improves knowledge and promotes positive attitudes toward dental caries prevention among Primary School Children's.

Keywords: Education, Audiovisual, Dental Caries, Primary School

Introduction

Dental caries is still one of the most common oral health problems in children, both globally and nationally. Based on the 2022 Global Oral Health Status Report from the World Health Organization (WHO), around 3.5 billion people in the world experience oral health problems, and more than 514 million of them are children with caries in their baby teeth. Most of these cases occur in middle-income countries, including Indonesia (WHO, 2025). In Indonesia, data from the Ministry of Health shows that 93% of children experience dental caries. The Basic Health Research (Riskesdas) revealed that dental caries is most commonly found at an early age, namely 81.5% in children aged 3-4 years and 92.6% in children aged 5-9 years. In fact, the prevalence of caries remains high in the productive age group to the elderly, which is above 87% (Kemenkes RI, 2019).

In West Java Province, the prevalence of dental caries was recorded at around 57.6%, while the latest research in 2023 showed a figure of 45.66% (Kemenkes RI, 2019). Data from the Health Office in 2024 noted that the South Cimahi area had the highest number of dental caries cases, namely 2,474 patients. One of the health

centers with the highest cases was the South Cimahi Health Center, which reported 819 cases (DinKes Kota Cimahi, 2024). Among the primary schools in this area, SD Plus Darussurur Al-Yahya recorded the highest caries prevalence, namely 92.29%, surpassing ten other schools. The high figure indicates that almost all students experience dental caries, so more intensive educational and preventive efforts are needed in the school environment (Puskesmas Cimahi Selatan, 2024).

Dental caries not only causes pain and infection but also has an impact on eating disorders, speech disorders, and decreased self-confidence in children (Saprudin et al., 2023). One of the main factors in the high prevalence of caries is the low level of knowledge about dental and oral care (Ramadhan et al., 2023). Knowledge is obtained through the process of sensing and understanding, which is the basis for the formation of healthy behavior. The higher a person's knowledge about the causes and prevention of caries, the more likely they are to adopt healthy living behaviors. In addition, attitudes towards dental health also influence behavior, such as brushing teeth regularly, limiting consumption of sweet foods, and having regular dental check-ups (Nurkhozizah, 2022). In children, this attitude is greatly influenced by the role of parents in forming habits of maintaining oral hygiene from an early age (Astutik et al., 2023).

Increasing knowledge and attitudes can be achieved through effective dental health education (Primawati Rena Setiana & Widi Anugrahati, 2021). One educational approach that has been proven to increase children's understanding and interest is the use of audiovisual media. This media combines visual and audio elements that can attract children's attention so that educational materials are easier to understand and remember. The use of audiovisual media involves two senses at once, namely sight and hearing, which makes it more effective than conventional media (Triswari & Quinta Zashika, 2019). Education with this approach is expected to form a stronger understanding and foster a positive attitude towards dental health, thus playing a role in efforts to prevent dental caries in primary school children (Ridha Azhari et al., 2021).

Research by Zhuhra et al. (2024) showed that education with audiovisual media significantly increased students' knowledge about dental and oral health at SDN Pertiwi Lamgarot, Aceh, compared to the lecture method, which had a lower increase (from a score of 60.19 to 71.15) (Zhuhra & Mardelita, 2024). Similar results were obtained from the study of Pitoy et al. (2021), who found that audiovisual media is more effective than other media, such as audio or flip cards, in improving students' understanding because it is able to attract attention and activate both main senses simultaneously (Pitoy et al., 2021). However, both studies have not simultaneously examined changes in knowledge and attitudes in one intervention that specifically highlights dental caries. In addition, there have been no similar studies conducted in the Cimahi area, especially at SD Plus Darussurur Al-Yahya, so this study is needed to fill this gap. Based on this background, this study aims to determine the effect of education using audiovisual media on knowledge and attitudes about dental caries in primary school children at SD Plus Darussurur Al-Yahya.

Methods

This study was a pre-experimental study with a one-group pretest-posttest design involving only one intervention group without a comparison group. The population consisted of 80 students in grades I to III at SD Plus Darussurur Al-Yahya who had dental caries, with a sample size of 45 respondents determined using the Slovin formula and selected through stratified random sampling based on grade level. Within each grade level, samples were taken using odd-numbered attendance lists to ensure random and proportional selection. Inclusion criteria were students who were willing to participate and had obtained parental consent, while exclusion criteria were students who were absent during any part of the study process.

The study was conducted on April 30, 2025. The research procedure began with coordination with the school and distribution of informed consent forms to students and parents. On the day of implementation, participants were gathered in a classroom and grouped according to their grade levels. They were first asked to complete the pretest questionnaire. Afterward, the students watched an educational animated video titled “Let's Keep Teeth Healthy”, which had a duration of 4 minutes and 5 seconds and had been developed and validated by a licensed dentist. After viewing the video, students were instructed to fill out the posttest questionnaire. Throughout the session, students were expected to pay attention to the video and answer all questions independently and honestly.

Data collection was carried out using two instruments: a knowledge questionnaire consisting of 18 multiple-choice questions, and an attitude questionnaire with 16 checklist statements (both favorable and unfavorable). Validity testing indicated that 16 of the 18 knowledge items and 14 of the 16 attitude items were valid. Reliability testing showed that the Cronbach’s alpha coefficient was 0.837 for the knowledge questionnaire and 0.791 for the attitude questionnaire, indicating good reliability. To ensure consistency of responses, all questionnaires were administered in the same environment with standardized instructions and

supervision by the same researcher.

Data were analyzed univariately to describe respondent characteristics and bivariately to examine the effect of the intervention. The Marginal Homogeneity test was used to assess changes in knowledge, while the McNemar test was applied to assess changes in attitude, both of which are suitable for paired categorical data. Ethical approval was granted by the Health Research Ethics Committee of STIKes Budi Luhur Cimahi (No. 72/D/KEPK-STIKes/III/2025), and informed consent was obtained from students and their parents prior to participation.

Results

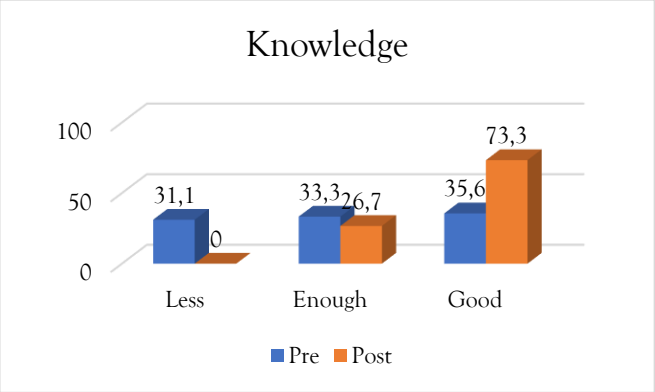
Description of knowledge before and after being given audiovisual media education about dental caries in primary school children's

Table 1 Frequency Distribution of Knowledge Level Before and After Education (n=45)

Knowledge	Pre-test		Post-test	
	F	%	F	%
Less	14	31.1	0	0.0
Enough	15	33.3	12	26.7
Good	16	35.6	33	73.3
Total	45	100.0	45	100.0

Based on table 1, out of 45 primary school students assessed before receiving audiovisual education about dental caries, the results showed that 16 students (35.6%) had high knowledge, 15 students (33.3%) had moderate knowledge, and 14 students (31.1%) had low knowledge. After the educational intervention, 33 students (73.3%) demonstrated high knowledge, 12 students (26.7%), had moderate knowledg, and none (0%) remained in the low knowledge category.

Graph 1 Change in knowledge before and after education (n=45)



Based on graph 1, there was a significant improvement in student's Knowledge levels following audiovisual education on dental caries. Initially, 31.1% of students had low knowledge, which completely decreased to 0% after the intervention. The proportion of students with moderate knowledge decreased from 33.3% to 26.7% , indicating a shift toward higher knowledge levels. Meanwhile, the percentage of students with high knowledge increased sharply from 35.6% to 73.3%.

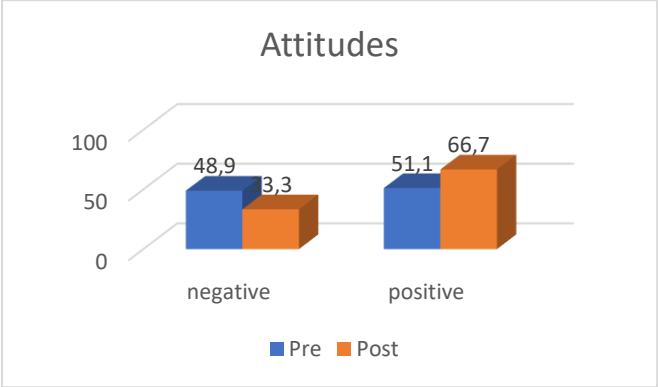
Description of attitudes before and after being given audiovisual media education about dental caries in primary school children's

Table 2 Frequency Distribution of Attitudes Before and After Education (n=45)

Attitudes	Pre-test		Post-test	
	F	%	F	%
Negative	22	48.9	15	33.3
Positive	23	51.1	30	66.7
Total	45	100.0	45	100.0

Based on table 2, out of 45 primary school students assessed before receiving audiovisual education about dental caries, the results showed that 23 students (51.1%) demonstrated a positive attitude, while 22 students (48.9%) showed a negative attitude. After the education, the positive attitude increased to 30 students (66.7%), while the negative attitude decreased to 15 students (33.3%).

Graph 2 Change in attitudes before and after education (n=45)



Based on Graph 2, 48.9% of students initially showed an negative attitude, which decreased to 33.3 % after intervention. Conversely, the proportion of students with a positive attitude increased from 51.1% to 66.7%.

The influence of audiovisual media education on knowledge about dental caries in primary school children's

Table 3 Influence of Education Using Audiovisual Media on Primary School Children's Knowledge of Dental Caries (n=45)

		Post Knowledge (After Education)		Total	P value
		Cukup	Baik		
Pre Knowledge (Before Education)	Less	8	6	14	0.001
	Enough	4	11	15	
	Good	0	16	16	
Total		12	33	45	

Based on Table 3, the results of the Marginal Homogeneity Test showed a p-value of 0.001 (< 0.05), thus Ho is rejected. It can be concluded that there is an effect of education using audiovisual media on the level of knowledge about dental caries in primary school children.

The influence of audiovisual media education on attitudes about dental caries in primary school children's

Table 4 Influence of Education Using Audiovisual Media on Primary School Children's Attitudes About Dental Caries (n=45)

		Post Attitudes (After Education)		Total	P value
		Negative	Positive		
Pre-attitudes (Before Education)	Negative	14	8	22	0.039
	Positive	1	22	23	
Total		15	30	45	

Based on table 4 McNemar test results showed a p-value of 0.039. The p-value (0.039) < α (0.05), so it can be concluded that there is an influence of education using audiovisual media on attitudes about dental caries in primary school children's.

Discussion

Description of Knowledge Before and After Audiovisual Media-Based Education on Dental Caries in Primary School Children

The study revealed a significant improvement in the level of knowledge among primary school children regarding dental caries following educational intervention using audiovisual media. Prior to the intervention, nearly two-thirds of the participants exhibited a suboptimal understanding of dental caries. However, after the implementation of audiovisual media-based education, the majority of respondents (73.3%) reached the 'good knowledge' category, and none remained in the 'poor knowledge' category.

This improvement highlights the effectiveness of audiovisual media as an educational tool in enhancing children's comprehension of dental caries. Children who initially possessed limited or basic knowledge were able to assimilate information more effectively through the simultaneous use of visual and auditory stimuli. Unlike traditional didactic methods, audiovisual media offer a multisensory learning experience that fosters increased attention, engagement, and information retention.

Based on these findings, the researchers argue that audiovisual media are highly suitable for dental health education, particularly among primary school-aged children. Given their developmental characteristics—such as short attention spans, a tendency to become easily bored, and a preference for dynamic and visually stimulating content—children benefit more from educational methods that are interactive and engaging. Audiovisual media present information in a format that is both accessible and appealing to this age group, facilitating more effective health education delivery.

Theoretically, this finding aligns with the perspective of Notoatmodjo (2014), who emphasized that knowledge acquisition occurs through sensory processes, especially those involving vision and hearing. Audiovisual media leverage these sensory channels, thereby reinforcing information reception and comprehension. This educational approach facilitates learning beyond mere knowledge acquisition, extending to deeper understanding and potential application.

The results are further supported by the findings of Zhuhra et al. (2024), who reported a significant increase in primary school students' knowledge of oral and dental health after receiving audiovisual-based education. The average knowledge score in the intervention group increased from 61.15 to 83.46 ($p < 0.001$), whereas the control group, which received education through

conventional lectures, demonstrated a considerably smaller improvement. These findings suggest that audiovisual media are more effective than traditional teaching methods in enhancing student understanding.

Additionally, the findings are corroborated by a study conducted by Fifiana et al. (2023), which observed that although most students possessed moderate knowledge about dental caries, their understanding of preventive measures remained relatively low (32%). This underscores the necessity for more engaging and comprehensible educational approaches, such as audiovisual media, to foster a comprehensive understanding of dental health from an early age.

Description of Attitudes Before and After Audiovisual Media-Based Education on Dental Caries in Primary School Children

The study showed that prior to receiving education through audiovisual media, 51.1% of respondents demonstrated positive attitudes toward dental caries prevention, while 48.9% exhibited negative behaviors. After the intervention, the proportion of positive attitudes increased to 66.7%, and negative attitudes declined to 33.3%.

This shift suggests a positive change in attitude following the educational intervention. Attitudes are composed of three components: cognitive (knowledge), affective (emotions), and conative (behavioral tendencies). Limited knowledge before education may have hindered the development of positive feelings and health-oriented behaviors (Notoatmodjo, 2014).

Education delivered through engaging audiovisual media enhanced children's knowledge, which positively influenced their emotional responses and behavioral tendencies. This was reflected in observable changes, such as increased regular tooth brushing and reduced consumption of sugary foods. The content's visual and auditory appeal not only conveyed information but also stimulated emotional engagement and behavioral motivation.

Audiovisual media are particularly effective for primary school children, whose learning styles are typically visual, active, and emotionally responsive. Unlike passive lecture methods, audiovisual education is interactive and concrete, helping children to better understand, internalize, and apply health messages in daily life. These findings align with Notoatmodjo's (2014) theory that attitudes are formed through stages of receiving, responding, valuing, and taking responsibility. Children who initially only received information began to demonstrate active engagement, such as mimicking tooth brushing motions, participating in discussions, or reminding peers about oral hygiene (Notoatmodjo, 2014). Supporting this, Saragih et al. (2024) noted that audiovisual media also promote character development in children, including values like honesty and responsibility. The simultaneous activation of visual and auditory senses reinforces both understanding and behavioral modeling (Saragih et al., 2024).

Furthermore, Rahmaniar et al. (2024) found that audiovisual education significantly improved positive attitudes related to clean and healthy living behaviors, particularly handwashing and personal hygiene. These findings underscore the effectiveness of audiovisual approaches in shaping attitudes and habits from an early age (Rahmaniar et al., 2024).

The influence of audiovisual media education on knowledge about dental caries in primary school children

Post-intervention analysis revealed a marked improvement in students' understanding of dental caries following the use of audiovisual media. Before the education was given, 14 children (31.1%) were included in the category of lacking knowledge. However, after being given education, all respondents showed an increase, with no more children being classified as lacking knowledge.

The results of the statistical analysis using the Marginal Homogeneity test showed a p-value = 0.001 (<0.05), so Ho was rejected and Ha was accepted. This means that there is a significant influence of education using audiovisual media on the level of children's knowledge about dental caries. These findings are consistent with a recent randomized clinical trial in Thailand (2025), which showed that edutainment-based video learning significantly improved children's oral health knowledge and behavior compared to traditional methods. (Lekaram et al., 2025).

According to researchers, audiovisual media provides a learning stimulus that is more lively, fun, and easily accepted by children. This media combines visual and auditory elements, two main sensory pathways that are very effective in conveying information at a young age. Audiovisual media also helps explain abstract concepts concretely, attracts attention, and maintains focus longer than conventional methods such as lectures or regular reading.

Theoretically, these results are in line with the Health Promotion Model (HPM) developed by Nola J. Pender. This model states that a person's health behavior is influenced by the interaction between cognitive-perceptual factors, learning experiences, and the environment. In the context of this study, the use of audiovisual media strengthens students' cognitive aspects (knowledge), creates positive learning experiences (activity-related affect), and increases children's self-efficacy or confidence in implementing healthy habits, such as brushing their teeth properly. This media also

increases children's perceptions of the benefits of maintaining dental health (perceived benefits), which ultimately influences changes in attitudes and behavior (Nursalam, 2013).

This study uses audiovisual media developed by researchers, which has gone through a validation process by dentists. This video presents material about tooth decay with interesting animations and narration. The validation results from dentists show that this video is very suitable for use in health education activities. The video effectively conveys key messages using age-appropriate visuals and engaging narration.

In line with this, the results of the study by Tandilangi et al. (2016) at SD Advent 02 Sario Manado also proved that animation media is very effective in improving the behavior of maintaining dental and oral health in primary school children. In the study, the group of students who received education with animation media showed a much higher increase in behavior scores compared to the control group (score difference 633 vs. 238), with a significance value of p = 0.000. The treatment group even reached the good behavior category, while the control group was still in the poor category (Tandilangi et al., 2016).

This finding is supported by the results of research by Pitoy et al. (2021), who reviewed nine literature and found that all of these studies reported an increase in students' knowledge scores after being given dental health education with audiovisual media. This media has been proven to be more effective than other educational methods because it is able to optimize the five senses, increase attention, and convey information in a way that is more enjoyable and easy for children to understand (Pitoy et al., 2021).

These findings are in line with a systematic review and meta-analysis by Bramati et al. (2024), which demonstrated that educational interventions particularly those employing interactive and audiovisual methods were effective in improving both knowledge and attitudes related to hearing health among children and adolescents. Although the focus was on noise-induced hearing loss prevention, the study reinforces the broader applicability of audiovisual education in facilitating health behavior change among young populations. (Bramati et al., 2024)

The influence of audiovisual media education on attitudes about dental caries in primary school children

Based on the analysis results, it was found that before being given education, only 23 respondents (51.1%) showed a positive attitude towards preventing dental caries. After being given education using audiovisual media, there was a significant increase in positive attitudes, namely to 30 respondents (66.7%). Meanwhile, the number of respondents who had negative attitudes decreased from 22 people to 15 people (33.3%). The results of the statistical test using the McNemar test showed a p-value = 0.039 ($p < 0.05$), which means that there is a significant influence between education using audiovisual media on changes in primary school children's attitudes regarding dental caries.

The researcher assessed that this change in attitude was not only influenced by an increase in the knowledge aspect (cognitive) but also by the emotional involvement and behavior of children during the learning process. Audiovisual media that presents information through a combination of sound, animation, and visualization is able to create a learning atmosphere that is more interesting, fun, and easy for children to understand. This provides stronger stimulation in forming a positive attitude towards healthy living behavior, especially in preventing dental caries.

Theoretically, this finding is in line with the Health Promotion Model (HPM) developed by Nola J. Pender. This model states that effective health promotion must consider three main components, namely: Cognitive-perceptual aspects, such as perceptions of the benefits and barriers to healthy behavior, Affective experiences related to activities, such as feelings of pleasure or displeasure when undergoing an action, Situational and interpersonal influences, such as influences from the surrounding environment, peers, and teachers (Nursalam, 2013). Audiovisual media strengthens perceived benefits and fosters positive emotional experiences. It also enhances interpersonal influences by delivering messages that are clear and relatable for children.

This study uses audiovisual media developed specifically for primary school children, which have gone through a validation process by dentists. This video presents material about dental caries with interesting animations and narration. The results of the validation by dentists show that this video is very suitable for use in health education activities. This video has proven effective in conveying information in a way that is fun and easy for children to understand. Our findings resonate with Kajal et al. (2020), who found that audiovisual aids significantly improved parental attitudes toward child oral health ($p < 0.005$). This underscores the importance of targeting both children and caregivers in comprehensive oral health education. (Kajal et al., 2020).

This finding is reinforced by research by Andayani et al. (2024), which shows that the development of dental and oral health education media based on animation using Adobe Animate is very effective and interesting for primary school children. The validation results from dental health workers and multimedia experts show that this media is very suitable for use in educational activities. In the field trial, this animation media received an appeal level of 92.37% and positive responses from various

aspects, proving that the media is effective in increasing understanding while forming positive attitudes in children (Andayani et al., 2024). Our findings resonate with Kajal et al. (2020), who found that audiovisual aids significantly improved parental attitudes toward child oral health ($p < 0.005$). This underscores the importance of targeting both children and caregivers in comprehensive oral health education.

In addition, the results of research from Aisy et al. (2024) also support this finding. In their research conducted at SD Muhammadiyah 2 Sukmajaya, Depok, it was found that education through animated video media was able to increase students' attitude scores from 45.05 to 46.93. The paired t-test showed a p-value < 0.05, which showed that audiovisual-based educational media significantly influenced improving students' attitudes and knowledge regarding the prevention of dental caries (Aisy et al., 2024).

The limitation of this study lies in the validation process of educational video materials that only involved a general dentist. Although the dentist has competence in the field of dental health, the researcher cannot be sure whether the validation sufficiently represents the educational needs that are in accordance with the characteristics and understanding of primary school-aged children. Ideally, validation of materials should also involve pediatric dentists who better understand the communication approach and substance of the material that is in accordance with the stages of children's cognitive development. This is important so that the delivery of information through audiovisual media is truly effective and accurate in increasing knowledge and forming positive attitudes towards children's dental health.

Conclusion

The results of this study indicate that education using audiovisual media has a significant effect on increasing students' knowledge and attitudes regarding dental caries at SD Plus Darussurur Al-Yahya. Before being given education, only 35.6% of students had good knowledge, while after the intervention it increased to 73.3%, with no students classified as having poor knowledge. Positive changes were also seen in the attitude aspect, where previously 51.1% of students showed a positive attitude, which increased to 66.7% after education. The results of the marginal homogeneity test showed a significance value of 0.001, indicating a significant effect of audiovisual education on increasing knowledge. Meanwhile, the McNemar test produced a significance value of 0.039, which confirmed that there was an effect on changes in students' attitudes.

These findings confirm that audiovisual media is an effective method of delivering dental health education to primary school children. This success supports its potential integration into structured school health programs or UKS (Usaha Kesehatan Sekolah) as a routine educational approach. Health offices and education departments are encouraged to adopt audiovisual media as a standardized tool in national dental health promotion programs, especially targeting early-aged children. This success can be a basis for implementing similar programs in other educational settings. For practical implementation, schools can collaborate with local Puskesmas to routinely provide audiovisual-based dental health education at least once every semester.

To improve the quality of future research results, it is recommended that video content validation involve pediatric dentists and media experts to ensure the accuracy of the content and the attractiveness of the delivery. In addition, attitude measurement should be conducted more than once to obtain a clearer picture of attitude change. Moreover, researchers and practitioners should consider involving teachers as co-facilitators during educational sessions to strengthen follow-up behavior and ensure continuity in daily practice. Further researchers can also add behavioral variables or integrate teaching aids as supporting media to strengthen the effectiveness of education.

Declaration of Conflicting Interest
No conflict of interest to declare.

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Author's Contribution
RNI conceived and designed the study, collected and analyzed the data, wrote and revised the manuscript, and approved the final version to be submitted for publication.

Data Availability Statement
The dataset generated during and analyzed during this study is available from the corresponding author upon reasonable request.

Declaration of Use of AI in Academic Writing
The author used ChatGPT/Gemini in the writing process to improve readability and remove grammatical errors. However, author took full responsibility for the content.

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