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The Effectiveness of Education Using Video Presentations on Improving Dental and Oral Health Knowledge in Grade IV Children in State Elementary Schools Bengalon 1

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ABSTRACT

Background: Dental and oral health problems in school-age children are still common and one of them is due to a lack of knowledge about how to maintain dental and oral health properly. Educational media in the form of video presentations can be used to improve student understanding because it combines visual and audio elements that are more interesting to children. This study aims to determine the effectiveness of dental and oral health education using presentation video media on the level of knowledge of grade IV elementary school students.
Method: This study uses a quantitative approach with a quasi-experimental pretest–posttest design. The research participants amounted to 52 grade IV students of SD Negeri Bengalon 1 who were selected using the purposive sampling technique. Data collection was carried out using a dental and oral health knowledge questionnaire of 10 questions given before and after the intervention. The intervention was in the form of a 5-minute educational video on how to maintain healthy teeth and mouth, tooth brushing techniques, healthy food, and prevention of dental diseases. Data analysis was carried out using the Shapiro–Wilk normality test and the Wilcoxon Signed Rank Test.
Result: The results showed an increase in students' knowledge scores after being given the intervention. The results of the Wilcoxon Signed Rank Test showed that there was a significant difference between the pretest and posttest scores with a significance value of 0.001 ($p < 0.05$). A total of 43 students experienced an increase in scores after being given education
Conclusion: Dental and oral health education using presentation video media is effective in improving the knowledge of grade IV elementary school students. Video media can be used as an interesting and effective health learning method for school-age children.

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INTRODUCTION

Dental and oral health is an integral part of a child's general health, which affects children's ability to eat, speak, learn, and confidence. Disturbances in dental health can cause children to have difficulty eating and reduce learning concentration. In Indonesia, the prevalence of dental caries in children is still very high, reaching 84.8% based on the results of the 2023 Indonesian Health Survey data. This condition shows that dental and oral health problems are still an important issue in public health, especially in elementary school-age children. Dental caries as one of the main problems can interfere with children's concentration of learning and quality of life. In Surakarta, it was recorded that 53% of 73 students experienced dental caries (Elsadek et al., 2023; SKI, 2023; Alifunisa et al., 2023).

Based on data from the Ministry of Education and Education, Laweyan District is recorded to have 32 public elementary schools that are officially registered in 2025, so this area is a relevant representation to observe the dental health condition of elementary school-age children (Ministry of Education and Culture, 2025).

Dental and oral health education is one of the promotive and preventive efforts that can increase children's knowledge and awareness about the importance of maintaining dental hygiene. The use of audiovisual media can significantly increase children's knowledge about dental health. Dental health promotion programs in schools that use digital media have a positive impact on children's knowledge, attitudes, and behaviors (Elsadek et al., 2023; Stuart et al., 2021).

This research has a strong urgency due to the increasing need for educational methods that are interesting, effective, and in accordance with the characteristics of children in the digital era. The use of video presentations in dental and oral health education is increasingly being applied because audiovisual media can convey information in an interesting, consistent, and easily playable manner so as to increase learning retention in children (Canadian Paediatric Society, 2019; Amro et al., 2026).

The selection of the research location in one of the public elementary schools in Laweyan District was carried out through a simple randomization process from the list of available State Elementary Schools, so that the selection of schools was objective and unbiased. From this process, SD Negeri Bengalon 1 was chosen as the research location because it has readiness to accept technology-based learning innovations. In addition, children in this region have good access to electronic devices such as computers and projectors, so that electronic educational media can be implemented effectively (Canadian Paediatric Society, 2019).

Thus, this study is important to assess the effectiveness of education using video presentations on improving children's dental and oral health at SD Negeri Bengalon 1. The results of this research are expected to be a scientific basis for the development of dental health promotion strategies using video presentations in public elementary schools.

METHOD

Research Design:

This study used a quasi-experimental one-group pretest-posttest design to assess the effectiveness of dental and oral health education using video presentation media on students' knowledge levels.

Participant:

The research participants are grade IV students of SD Negeri Bengalon 1 who meet the inclusion criteria and obtain approval from parents/guardians to participate in the research.

Population and the Methods of Sampling:

The research population was 52 grade IV students at SD Negeri Bengalon 1. The sampling technique used is purposive sampling by involving all students who meet the research criteria as respondents.

Instrumentation:

The research instrument is in the form of a dental and oral health knowledge questionnaire consisting of 10 multiple-choice questions. Each correct answer is given a score of 1 and an incorrect answer is given a score of 0, with a maximum total score of 10. The questionnaire includes material on dental and oral hygiene, healthy and karyogenic diets, caries prevention, and dental care. The results of the validity test show that all items have a value of r calculated > r of the table (0.361), so it is declared valid. The reliability test using Cronbach's Alpha obtained a value of 0.837 indicating a reliable instrument. Educational video media has also been tested for validity using Aiken's V with the results of all items obtaining a score of >0.8.

Instrument:

The intervention media used was a 5-minute educational video containing material on how to brush your teeth correctly, prevention of dental problems, healthy foods for teeth, and introduction to dental and oral diseases.

Procedures and Time Frame:

The research will be carried out in January-March 2026. On the first day, a pretest is carried out to measure students' initial knowledge. Furthermore, the educational video was played for five consecutive days. After the intervention is completed, a posttest is carried out to determine the change in the level of knowledge of students after being educated.

Analysis Plan:

Data analysis was conducted using IBM SPSS version 25. The normality test uses the Shapiro–Wilk test. If the data is normally distributed, the Paired Sample t-test is used to compare pretest and posttest scores. If the data is abnormal, the Wilcoxon Signed Rank Test is used. The significance value was set at $p < 0.05$.

Scope and/or Limitations:

This research was only conducted on grade IV students in one elementary school so the results of the study have limitations in generalization. In addition, the short duration of the intervention and the use of questionnaires as a measuring tool may affect the results of the study.

Reporting Guideline:

The preparation of the manuscript follows CONSORT's recommendations for interventional and quasi-experimental research.

RESULTS AND DISCUSSION

Results:

Respondent Characteristics

Table 1. Respondent Characteristics

Characteristics	Categories	N	%
Age	9 Years	6	11,5
	10 Years	32	61,5
	11 Years	14	26,9
Gender	Male	24	46,2
	Women	28	53,8
Classes	IV A	25	48,1
	IV B	27	51,9

Based on Table 1, most of the respondents were 10 years old as many as 32 students (61.5%), followed by 11 years old as many as 14 students (26.9%), and 9 years old as many as 6 students (11.5%). Based on gender, female respondents were slightly more than 28 students (53.8%) compared to male 24 students (46.2%). The distribution of respondents by class was also relatively balanced between classes IV A and IV B.

Distribution of Pretest and Posttest Correct Answers

Table 2. Distribution of Pretest and Posttest Correct Answers

Questions	Pretest IV A n (%)	Pretest IV B n (%)	Posttest IV A n (%)	Posttest IV B n (%)
1	11 (44%)	13 (48%)	15 (60%)	20 (74%)
2	21 (84%)	21 (78%)	23 (92%)	25 (93%)
3	21 (84%)	20 (74%)	22 (88%)	24 (89%)
4	21 (84%)	20 (74%)	23 (92%)	24 (89%)
5	21 (84%)	19 (70%)	23 (92%)	24 (89%)
6	21 (84%)	20 (74%)	23 (92%)	25 (93%)
7	8 (32%)	6 (22%)	17 (68%)	22 (81%)
8	5 (20%)	7 (26%)	12 (48%)	20 (74%)
9	3 (12%)	5 (19%)	18 (72%)	23 (85%)
10	20 (80%)	23 (85%)	22 (88%)	25 (93%)

Based on Table 2, the results of the pretest show that most students have a good initial knowledge of questions 2–6 with a relatively high percentage of correct answers. However, in questions number 7, 8, and 9 the percentage of correct answers is still low. After being given an intervention in the form of dental and oral health education videos, there was an increase in the percentage of correct answers on almost all question items, especially on questions 7, 8, and 9. This shows that presentation video media is able to increase students' understanding of dental and oral health materials.

Normality Test

Table 3. Normality Test Results

Variable	Kolmogorov-Smirnov Sig.	Shapiro-Wilk Sig.
Pretest	0,000	0,000
Posttest	0,000	0,000

Based on Table 3, the significance values of the pretest and posttest in the Kolmogorov–Smirnov and Shapiro–Wilk tests showed $p < 0.05$, so that the data were declared not to be normally distributed. Therefore, the analysis was continued using the non-parametric Wilcoxon Signed Rank Test.

Analysis of Pretest and Posttest Differences

Table 4. Wilcoxon Signed Rank Test Results

	N	Mean Rank	Sum of Ranks	Z	Sig. (2-tailed)
Negative Ranks	7	23,17	69,50		
Positive Ranks	43	23,52	1011,50		
Ties	6	-	-		
Total	52			-3,43	0,001

Based on Table 4, 43 respondents experienced an increase in scores after the intervention, while 7 respondents experienced a decrease in scores and 6 respondents did not experience any changes. The results of the Wilcoxon test showed a significance value of 0.001 ($p < 0.05$), so it can be concluded that there is a significant difference between the pretest and posttest values. These results show that dental and oral health education using presentation video media is effective in increasing the knowledge of elementary school students.

Discussion:

Grade IV elementary school students who were respondents in this study were in the age range of 9–11 years, with the highest distribution of 10 years old (61.5%), followed by 11 years old (26.9%) and 9 years old (11.5%). This age range is included in the stage of concrete operational cognitive development according to Jean Piaget's theory, which is the stage in which the child begins to be able to think logically about concrete information, understand simple cause-and-effect relationships, and process visual and auditory information systematically. These characteristics make grade IV students a suitable group to receive dental and oral health education through video presentation media, which presents concepts concretely through a combination of visual and sound elements (Piaget, 1966).

This study began with the provision of a pretest to all 52 respondents to measure the level of initial knowledge before being given an intervention. Based on the distribution of pretest correct answers in Table 5, it can be seen that in questions 2 to 6, most students have been able to answer correctly with a relatively high percentage (ranging from 70%–84% in both classes). This indicates that students have a fairly good initial knowledge of certain material indicators, likely coming from daily experiences, learning in the family environment, or from teachers at school. However, in questions number 7, 8, and 9, the percentage of correct answers is still relatively low. In class IV A, the percentage of correct answers for question number 7 is 32%, number 8 is 20%, and number 9 is 12%. In class IV B, the percentage for question number 7 is 22%, number 8 is 26%, and number 9 is 19%. The low correct answers to the three questions indicate that students' understanding of cariogenic food materials, how to maintain dental and oral health, and vitamins for dental health is still very lacking, so a more structured and interesting educational intervention is needed.

After being educated using the video presentation given, there was a significant increase in the percentage of correct answers in almost all question numbers, both in classes IV A and IV B. The most striking increase was seen in questions number 7, 8, and 9 which previously had a low percentage. In question number 7, class IV A increased from 32% to 68% and class IV B increased from 22% to 81%. In question number 8, class IV A increased from 20% to 48% and class IV B increased from 26% to 74%. In question number 9, class IV A increased from 12% to 72% and class IV B increased from 19% to 85%. These results show that material that was previously difficult for students to understand becomes easier to understand after being educated through video presentations. This improvement indicates that video presentation media is able to assist students in receiving, processing, and understanding dental and oral health information, especially on concepts that are abstract or require concrete visualization. Similar findings were reported by Suryani et al. (2023), who found that video-based health education significantly improved school children's knowledge regarding cariogenic foods. This finding is also consistent with Aisyah et al. (2023), who reported that audiovisual-based dental health education significantly improved oral health knowledge among elementary school students.

Before further statistical analysis was carried out, a normality test was first carried out using the Kolmogorov-Smirnov and Shapiro-Wilk methods to determine whether the pretest and posttest data were normally distributed. The results of the normality test in Table 6 show that the significance value for the pretest and posttest data is 0.000 each, which means it is less than 0.05 ($p < 0.05$). Thus, the pretest and posttest data are not distributed normally. This condition can occur due to a wide variation in scores or the existence of extreme scores in a group of respondents. Therefore, the next analysis does not use parametric tests (such as the Paired Sample t-test), but rather uses a non-parametric test, namely the Wilcoxon Signed Rank Test, which is more suitable for paired data that does not meet the assumption of normality.

The results of the Wilcoxon Signed Rank Test showed that out of 52 respondents, 43 experienced positive ranks between pretest and posttest scores, 7 experienced negative ranks, and 6 showed no changes in scores (ties). The dominance of respondents with increased scores indicates that there was an improvement in students' knowledge after the educational intervention. The results of further statistical tests yielded a Z-value of -3.43 with a significance value (Asymp. Sig. 2-tailed) of 0.001. Because the significance value is less than 0.05 ($p < 0.05$), it can be concluded that there is a statistically significant difference between the pretest and posttest scores. Thus, educational interventions using video presentations have a significant effect on improving dental and oral health knowledge in grade IV elementary school students. The significant increase observed in this study is consistent with the findings of Purba et al. (2022), who demonstrated that video-based health promotion effectively improved elementary school students' knowledge of dental and oral health.

This significant increase in knowledge is in line with Piaget's theory of cognitive development, which states that children of primary school age (7–11 years old) are at a concrete operational stage. At this stage, children need to present material that is concrete, visual, and relevant to everyday experiences to make it easier to understand. Video presentations, with their ability to display moving images, animations, illustrations, and sound narratives, provide visual and auditory stimuli appropriate to those developmental stages. Previously abstract concepts, such as the process of demineralization of teeth due to cariogenic foods or the mechanism of action of vitamins in maintaining gum health, can be visualized concretely through videos. This allows students to build understanding through the processes of assimilation (adapting new information to existing schemas) and accommodation (changing the schema of thinking in the face of new experiences), as described in Piaget's theory of constructivism (Piaget, 1966; Angki et al., 2025).

The effectiveness of video presentations in this study is also supported by the cognitive theory of multimedia learning proposed by Mayer. This theory explains that learning will be more

effective if information is presented through a combination of text, images, and sound, as the human brain processes visual and auditory information through two separate channels that complement each other. The presentation video used in this study was designed by combining clear narratives, supporting animations, and structured material segmentation. Multimedia design principles such as signaling, segmentation, and modality help reduce the cognitive load on students' working memory (Mayer & Clark, 2016). This is very important considering that children aged 9–10 years have limited working memory capacity, only able to hold about 3–5 information at a time. With a presentation that is not excessive and structured, students more easily understand and remember information on how to maintain dental and oral health, which is reflected in the increase in the percentage of correct answers on the posttest (Fiorella & Mayer, 2015).

In addition, the success of presentation videos can be explained through Jerome Bruner's theory of learning about the three stages of representation, namely: enactive, iconic, and symbolic. The enactive stage deals with learning through direct action, the iconic stage through images or visualization, and the symbolic stage through abstract language or concepts. Video presentations facilitate the iconic stage (through images, animations, and illustrations) and the symbolic stage (through voice and text narration) simultaneously. In the context of dental health education, students can visually observe examples of cariogenic foods such as candy, chocolate, and soft drinks, see simulations of correct brushing techniques (e.g., Fone's child-friendly method), and hear explanations of the benefits of vitamins A, C, and D for dental and gum health. This combination helps students build understanding gradually from concrete to abstract, while also increasing motivation and information retention. The results showed a significant increase in previously low questions, such as questions about cariogenic foods (question number 7), how to maintain dental health (question number 8), and vitamins for dental health (question number 9), which indicates that these materials are successfully understood through iconic and symbolic representations in videos (Fauziati, 2021; Siwi et al., 2025).

The results of this study are also in line with previous findings showing that audiovisual-based dental health education can significantly improve elementary school students' knowledge of oral health. Educational videos are particularly effective because they combine visual and auditory stimuli, making information easier to understand and remember. Previous studies reported that audiovisual media improved students' understanding of proper oral hygiene practices and increased their engagement during learning activities (Pitoy et al., 2021; Aisyah et al., 2023). Similarly, Siwi et al. (2025) found that dental health education delivered through video significantly improved elementary school students' knowledge of oral and dental health. In addition, the use of video in elementary school learning has been shown to improve learning outcomes by attracting students' attention, presenting concepts visually, and allowing repetition of learning materials (Agustia et al., 2024). Therefore, the findings of this study further strengthen the evidence that video presentations are an effective medium for dental and oral health education among elementary school children.

This study has several limitations, namely the absence of a control group in the design of a one-group pretest-posttest so that external factors such as environmental influences and other learning cannot be fully controlled. In addition, the study was only conducted on grade IV students in one school with a limited number of samples, so the results could not be generalized widely. This study also only assesses aspects of knowledge without looking at changes in dental and oral hygiene behavior, and does not measure knowledge retention in the long term due to the short study time. In addition, external factors such as family influence, media, and internal factors such as motivation and attention during learning have also not been optimally controlled, so it is recommended that further research use a stronger design, wider sample coverage, and behavioral measurement and long-term follow-up.

Implications:

The results of this study show that presentation video media can be used as an effective method of dental and oral health education for elementary school students. The delivery of material through a combination of visual and audio helps students more easily understand information, increase attention, and make the learning process more interesting than ordinary lecture methods. These findings can be considered for schools and health workers to utilize audiovisual media in health education programs, especially in promotive and preventive activities for dental and oral health in the school environment

Research contribution:

This research contributes to the development of audiovisual-based dental and oral health education media for elementary school students and strengthens empirical evidence regarding the effectiveness of video media in improving health knowledge.

Limitations :

This study has several limitations, namely the research was only conducted in one school with a limited number of respondents so that the results of the study could not be generalized widely. In addition, the study did not use a control group so the influence of external factors could not be fully controlled. This study also only measured the increase in student knowledge through questionnaires without assessing changes in dental and oral health behavior or long-term knowledge retention.

Suggestions:

Further research is recommended to use a more robust research design involving control groups and larger sample numbers to make the results more representative. In addition to assessing the knowledge aspect, subsequent research also needs to measure changes in students' dental and oral health behaviors and conduct long-term evaluations to determine the sustainability of educational effects. The development of more interactive and innovative educational media can also be done to increase the effectiveness of health learning in elementary school-age children.

CONCLUSION

Based on the results of the study, dental and oral health education using presentation video media has proven to be effective in increasing the knowledge of grade IV elementary school students. This is shown by an increase in posttest scores compared to pretest and the results of the Wilcoxon Signed Rank Test which showed a significant difference between before and after the intervention ($p < 0.05$). Presentation video media is able to help students understand dental and oral health materials better through attractive visual and audio presentations and are appropriate to the cognitive development stages of elementary school age children. Thus, the purpose of the study to determine the influence of dental and oral health education using video presentation media on students' knowledge levels has been achieved. This research is expected to be the basis for the development of more innovative audiovisual-based health education media and can be applied more widely to school health programs in the future.

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AUTHOR CONTRIBUTION STATEMENT

AZ contributes to the preparation of research concepts, data collection, data analysis, and manuscript writing. AA contributes to research supervision, instrument validation, and manuscript revision and refinement.

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