JDHT Journal of Dental Hygiene and Therapy
Volume 7, Nomor 2 Tahun 2026, pp. 212-217
ISSN (online): 2723-1607 DOI: 10.36082/jdht.v7i2.3536

DEVELOPMENT AND FEASIBILITY OF AI- BASED 3D ANIMATION VIDEO BRUSHING TEETH TO IMPROVE TEETH BRUSHING KNOWLEDGE AND SKILLS IN KINDERGARTEN STUDENTS

Yeni Desriwati Tanjung[1], Suhartono[2], Risda Alvia Mukhlisa[3]
[1,2,3] Department of Dental Health Therapist, Poltekkes Kemenkes Jambi, Indonesia

Info Article

Article History:
Received: 18 Sept 2026
Revised: 11 Oct 2026
Accepted: 13 Oct 2026
Available Online: 15 Oct 2026

Keywords:
brushing teeth, 3D video, AI

This is an open access article under the CC-BY-SA license.
Copyright © 2026 by Author.
Published by Politeknik Kesehatan Kemenkes Jakarta I

Abstract

Oral health is a condition in which the mouth, teeth, and related elements in the oral cavity are in a healthy condition that allows a person to perform important functions such as eating, breathing, speaking, and interacting socially. Children are one of the vulnerable groups targeted by dental and oral health services . One way to increase knowledge about maintaining dental health is by using animated videos on brushing teeth. Educational activities based on how to brush teeth properly by brushing your teeth morning and night using animated videos with AI technology. The aim of this study is to produce a 3D animated video on tooth brushing that is suitable for use as a dental health education medium. This research method uses a mixed methods and research and development (R&D) research design. There are five stages of research: 1. Analyze, 2. Design, 3. Develop, 4. Implement, and 5. Evaluate.The results of the study showed that the validation results of media experts were 36 (90%) with the criteria for media feasibility being very feasible with revision. The validation results of media experts were 35 (87.5%) with the criteria for media feasibility being very feasible with revision. The results of the trial of the media or the responses from children in kindergarten were 1325 (maximum value 1500), with a percentage of the total score of 88.3% and the criteria for media feasibility being very feasible. Based on the assessments of expert validators including media, subject matter, and language experts the 3D animated video on oral health is deemed highly suitable for dental health promotion, serving as a medium to enhance the knowledge and toothbrushing skills of kindergarten children.

Corresponding author:
Risda Alvia Mukhlisa
Jambi, Indonesia
Email: risdaalvia@gmail.com

Introduction

Oral and dental health is a condition where the mouth, teeth and related elements in the oral cavity are in a healthy condition that allows a person to perform important functions such as eating, breathing, speaking, and interacting socially. Children are one of the vulnerable groups targeted by oral and dental health services(Laksono et al., 2023). Oral and dental health also includes psychosocial dimensions such as self-confidence, well-being and the ability to socialize and work without pain and discomfort(Nurhamsyah et al., 2025). Signs of healthy teeth are teeth in good condition, strong teeth, not brittle and not loose, the color of the gums looks bright pink, the gums firmly bind the teeth, there are no visible gaps between the teeth and gums(Meidina et al., 2023). Dental care from an early age prevents damage to the enamel and the strength of the growth of children's teeth(Theresia et al., 2025).

Factors that can influence the occurrence of dental caries in children come from internal and external sources. Internal factors include bacteria, carbohydrates, tooth surface vulnerability, and time. External factors include age, gender, ethnicity, geographic location, social culture of the population, and the role of parents. In maintaining dental and oral health(Santoso et al., 2020).

In Indonesia, several dental and oral health problems include high caries problems, low levels of accessibility to dental care and lack of education about the importance of maintaining dental and oral health. The results of the 2018 Basic Health Research also showed that the prevalence of dental caries reached 88.80%(Kemenkes, 2018). Based on the results of interviews at the 2023 SKI, dental and oral health problems in the population aged ≥ 3 years were 56.9%. Dental and oral health in Indonesia needs more serious attention, because for the age groups 3-4 years, 5 years and > 35 years are still in the high and very high DMF-T Index category (Kesehatan, 2023).

The high prevalence of dental health issues among young children is generally attributed to a lack of

knowledge and skills regarding proper tooth-brushing. At this stage, children do not yet fully grasp the importance of maintaining oral hygiene or the adverse effects of consuming high-sugar foods on dental health. A lack of awareness regarding correct brushing techniques, combined with insufficient dental health education from an early age, can lead to problems such as cavities and other oral health issues (Laily, 2025). Health education for young children utilizes engaging learning materials and demonstrates proper tooth-brushing techniques to motivate them to brush regularly and maintain good oral health (Tobing et al., 2025). Media in the learning process are intended to facilitate students in gaining a better understanding of the material and concepts being taught (Puspitawati et al., 2022).

The average correct tooth brushing behavior among Indonesians aged over 3 years is 20.8%6. This shows that there is still a lack of awareness among Indonesians regarding the importance of maintaining dental and oral health. Dental health education is a dental health education activity carried out by disseminating messages, instilling confidence, so that the community is not only aware, knows, understands, but also wants and can do it independently(Widodo & Hamid, 2020). One way to increase knowledge about maintaining dental health is by using animated tooth brushing video media. Educational activities based on how to brush teeth correctly by brushing teeth morning and night using animated video media with AI technology. To overcome this weakness is by utilizing technology, which is packaged in the form of an Android-based application so that it no longer requires paper, a tooth brushing monitoring calendar application besides being able to remind people when to brush their teeth can provide information about dental and oral health (Risma et al., 2025).

Nowadays, creating educational videos has become very easy and effective thanks to technological advances, one of which is Artificial Intelligence (AI) which is increasingly widespread and needed in human life such as education, services, and so on. This development is marked by the many devices that use artificial intelligence or AI-based technology(Romundza et al., 2023).

In Jambi Province, the age group with the highest number of decayed, cavities, or diseased teeth is 5-9 years old, at 43.01%. In terms of tooth brushing behavior in 2018, it was found that 94.7% of Indonesians brush their teeth every day, but only 2.8% of the total brush their teeth correctly. The proportion of tooth brushing behavior based on the 5-9 year age group brushing their teeth every day was 93.2%, but the correct time for brushing their teeth was only 1.4%. Meanwhile, in Jambi Province, it was found that 96.4% brushed their teeth every day, only 1% brushed their teeth the correct time (brushing their teeth after breakfast and before going to bed). Nationally, tooth brushing behavior in Jambi Province was the lowest in Indonesia (Kristianto et al., 2018).

According to Kristianto's research (2018), counseling using video media accompanied by tooth brushing demonstrations has been proven to improve dental and oral hygiene(Kristianto et al., 2018). The results of the study are also similar to research conducted by Hendriani (2023) that video media is effective in improving tooth brushing skills with the "Roll" technique in kindergarten children in Bandung City(Hendriani et al., 2023).

Method

This development refers to the ADDIE Development Model. This model was chosen because ADDIE is the latest and most relevant development model. Each stage in the ADDIE model has been revised to be more dynamic, flexible, and sustainable. The implementation of the research and development of dental and oral health education media for tooth-brushing clowns includes five stages, each of which consists of several stages, namely:

1. Analysis. Analyze the needs in the data collection process to determine the problem and the appropriate solution and determine the toothbrushing material. Problems encountered in the field regarding media still use commonly used media such as posters, plycharts, phantom models, and others. No one has used 3D animated video media that utilizes AI technology. The results of research by Surayah et al., stated that counseling using interactive video media showed effective test results.
2. Design. The product components are assembled. The goal is to create interactive learning media, namely 3D video with AI technology. The media expert validation instrument design and product trials are conducted after the product is created. Media expert validation will be assessed by a certified media technology expert with a computer science master's degree and a health lecturer.
3. Development. At this stage, we are producing a product in the form of a 3D animated video using AI technology to improve knowledge and skills on proper tooth brushing.

Open Access: http://ejournal.poltekkesjakarta1.ac.id/index.php/JKG
Email: jdht@poltekkesjakarta1.ac.id

4. Implementation. At this stage, the research subjects were prepared for the Muslimat Kindergarten students in Jambi City.
5. Evaluation. At this stage, an evaluation is conducted after the product's implementation in the field, namely evaluating the results after watching a 3D animated video using AI technology.

The research subjects consisted of expert evaluators (subject matter experts, media experts, and language experts). Media testing was conducted with 30 students from Muslimat Kindergarten in Jambi City. Sampling using the total sampling technique.

The data collection instrument used was a questionnaire. The questionnaire in this study employed a Likert scale, featuring a range of values from highest to lowest. The researcher utilized several questionnaires, including those for subject matter experts, media experts, and language experts, as well as an assessment questionnaire for kindergarten student respondents.

The quantitative data in this research and development consist of:

1. Assessment scores from expert validation;
2. Scores from product trials;
3. Scores from usage trials.

Data from the toddler response questionnaire were measured using a Likert scale. Consequently, if the final results from the expert assessments, product trials, and usage trials meet at least the "feasible" (or "suitable") criterion, the developed healthy-teeth nutrition product can be considered suitable for use.

Result

A. Internal Test

The feasibility of 3D animated videos based on media and material expert assessments was carried out based on validation from each of three experts, and the card underwent one revision. The results of the media expert validation can be seen in Table 1 and the material expert validation in Table 2.

Table 1. Media Expert Validation Results

No	Indicator	Maximum Value	Evaluation	%
1	Material	10	8	80
2	Contents	15	14	93
3	Learning materials	15	14	93
	Total	40	36	90

In table 1 it can be seen that the assessment or validation carried out by experts on the media can be seen that the maximum value that can be obtained is 40 and the assessment obtained from the results of the media expert validation is 36 (90%) with the media suitability criteria being very suitable with revision .

Table 2. Material Expert Validation Results

No	Indicator	Maximum Value	Evaluation	%
1	Media Quality	35	30	85.7
2	Audiovisual Quality	5	5	100
	Total	40	35	87.5

In table 2, it can be seen that the assessment or validation carried out by experts on the media shows that the maximum value that can be obtained is 40 and the assessment obtained from the results of the media expert validation is 35 (87.5%) with the media suitability criteria being very suitable for revision.

B. User Testing

Table 3. User Test Results on 3D Tooth Brushing Video Media

No	Statement	Evaluation	Maximum Value	%
1	The picture looks very interesting	127	150	85
2	The sound in the video is clearly audible.	127	150	85
3	The sound of the music/song is very happy and enthusiastic	137	150	91
4	This video contains information about how to brush your teeth properly and correctly.	132	150	88
5	The characters in the video can attract my attention	135	150	90
6	Videos can be watched anywhere	136	150	91
7	I am interested in watching this video many times	132	150	88

8	Videos can be watched together with friends	132	150	88
9	The language used is simple and easy to understand	134	150	89
10	Watching this video makes it easier for me to understand the correct tooth brushing movements.	133	150	89
	Total	1325	1500	88.3

Based on table 3, it shows that the average score of the assessment results of the trial of the media or the responses of children in kindergarten is 1325 (maximum value 1500), with a percentage of the total score of 88.3% and the media suitability criteria are very appropriate.

Video is 2 minutes 47 seconds long and contains an explanation of how to brush your teeth properly and correctly, along with an explanation in simple language that is easier for children to understand. By increasing the way children brush their teeth, it is hoped that it can prevent caries and other dental and oral diseases that can affect food intake in children.

A video clip demonstrating how to brush your teeth can be seen in the image below.

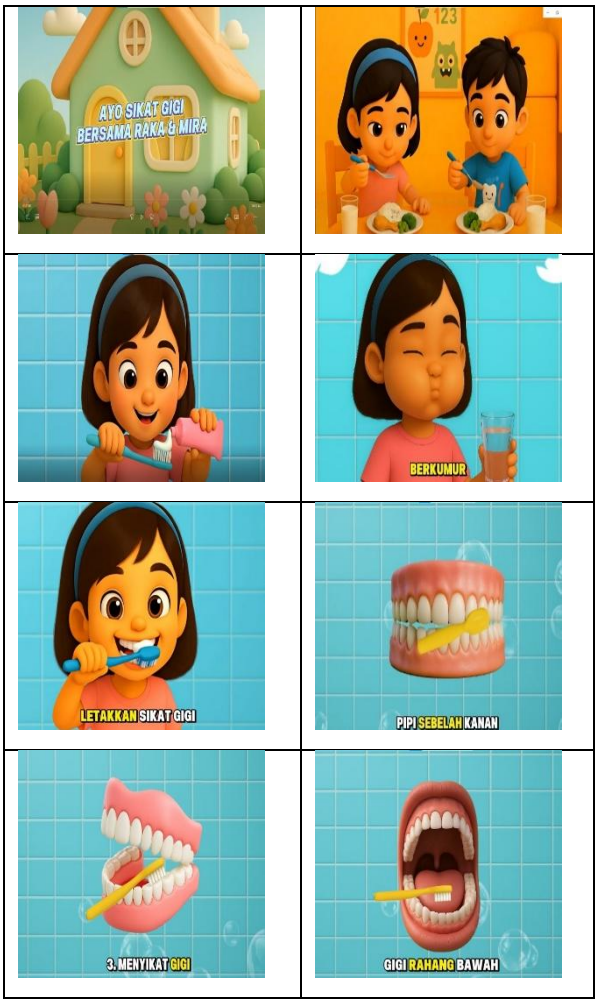


Figure 1. Video Clip Demonstrating How To Brush Your Teeth

This research is in line with the research conducted Rini (2024) which obtained research results showing that the use of videos in teaching children to brush their teeth is proven to be effective in improving children's ability to brush their teeth(Rini, 2024). This is also supported by research conducted by Rahman (2021) 14 from the results of the study it is known that video media is effective in improving tooth brushing skills in children at PAUD Islam Annur Jambi City because the message conveyed with video is more interesting and motivating for the audience. The message conveyed is more efficient because moving images can communicate quickly and realistically (Rahman & Purwakanthi, 2021).

A visual medium, if chosen correctly and appropriately, will have a value equivalent to thousands of words, and will also be emotionally more capable of attracting attention, and another possibility is that it can make the intended message less boring/satisfying, so that it can make the learning process easier, more interesting and more enjoyable(Zahara, 2020).

Education is a tool or support tool in the learning process that functions as an intermediary to increase

Open Access: http://ejournal.poltekkesjakarta1.ac.id/index.php/JKG
Email: jdht@poltekkesjakarta1.ac.id

effectiveness and efficiency in achieving learning goals. One of the media used in education is video, namely a series of images processed into movement and equipped with sound, so that it is more interesting and able to convey learning messages better. The use of video media can help preschool children recognize the parts of the teeth and demonstrate the correct steps for brushing teeth, such as the front, sides, chewing surface, inside, and tongue(Oktaviani et al., 2022).

Dental caries is one of the dental health disorders that are prone to occur in children. Dental health is important, especially for children's development. Dental caries causes children to experience loss of chewing ability (impaired chewing function), affects appetite, nutritional intake and digestive disorders and results in less than optimal growth, which ultimately affects the child's nutritional status(Indanah et al., 2024). Factors that trigger dental caries are numerous, including tooth structure, oral microorganisms, tooth brushing time, tooth brushing frequency, consumption of foods containing carbohydrates and the length of time food remains in the mouth(Hakim et al., 2025).

Children should get used to brushing their teeth properly and on time every day, preferably immediately after eating and before bed. The importance of brushing their teeth at night is one strategy to protect children from tooth decay. Food particles that are still stuck to the teeth will turn into plaque if not cleaned properly, which is the main cause of tooth decay(Rustono et al., 2023). The ability to brush teeth properly and correctly is a very important factor in maintaining dental and oral health. The success of maintaining dental and oral health is also influenced by factors such as the use of tools, brushing methods, and the correct frequency and time of brushing. The correct technique and method of brushing teeth greatly affect dental hygiene. The most important time to brush your teeth is after breakfast in the morning and before going to bed at night (Haloho et al., 2025)

Video is an excellent learning medium for preschoolers (ages 5–6). At this age, children learn best through visual and auditory experiences: movement, color, rhythm, and song help them grasp new steps and retain them longer. Video allows for consistent, concise, and interactive presentation of material for example, animated characters demonstrating techniques, repeated refrains, and pauses to imitate actions so that practical skills (like brushing teeth) become enjoyable routines. Furthermore, parents/teachers can repeat difficult sections until the child masters them, making video a flexible and resource-efficient tool for early childhood education(Natsir, 2024). Another important practical advantage of video is that the material can be standardized so that every child receives the same instructions; the duration can be adjusted to maintain focus; and the video can be repeated repeatedly, strengthening motor memory and forming habits. With its child-friendly design contrasting colors, relatable characters, simple language, and short interactive activities videos not only convey information but also motivate and change behavior. Therefore, for the purpose of teaching practical skills and healthy habits to children aged 5–6 years, video media is a very suitable and efficient choice(Syarifah, 2025).

Conclusions and Suggestions

The 3D AI tooth brushing video has been tested for feasibility on internal experts, namely media experts and material experts, and on users, namely 30 students of Muslimat Kindergarten in Jambi City, with very good results.

References

Hakim, L., Afrinis, N., & Alini. (2025). Hubungan Frekuensi, Waktu Menyikat Gigi Dan Kebiasaan Konsumsi Makanan Kariogenik Dengan Kejadian Karies Gigi Pada Anak Usia Dini Di Tk Pertiwi Tahun 2022. *Jurnal Kesehatan Terpadi*, *4*(1), 18–28. http://ejr.umku.ac.id/index.php/jikk/article/view/2198

Haloho, D. N., Bintang, G. V., Widjaja, G. A., Sihombing, J. S., Abigayl, I., & Lesmana, D. (2025). Efektivitas Penyuluhan Menggunakan Video Animasi Mengenai Cara Menyikat Gigi dengan Benar pada Anak Sekolah Dasar. *E-GiGi*, *13*(2), 390–397. https://doi.org/10.35790/eg.v13i2.60233

Hendriani, Y., Annisa, M. T., Laela, D. S., & Octaviana, D. (2023). Effectiveness of Providing a Video on How to Brush Teeth with Roll Technique on Tooth Brushing Skills of Kindergarten Students in Bandung City. *J Clin Den & Oral Care*, *1*(4), 1–04. www.mkscienceset.com

Indanah, Faridah, U., & Mutomimah, S. (2024). Karies Gigi Pada Anak Dan Hubungannya Dengan Pengetahuan Ibu Serta Aktifitas Gosok Gigi Anak. *Jurnal Ilmu Keperawatan Dan Kebidanan*, *15*(1), 142–148. http://ejr.umku.ac.id/index.php/jikk/article/view/2198

Kemenkes. (2018). Laporan Riskesdas 2018. *Laporan*

Nasional RIskesdas 2018, *53*(9), 181–222. http://www.yankes.kemkes.go.id/assets/downloads/PMK No. 57 Tahun 2013 tentang PTRM.pdf

Kesehatan, K. (2023). *Survei Kesehatan Indonesia*.

Kristianto, J., Priharti, D., & Abral, A. (2018). Efektifitas Peyuluhan Kesehatan Gigi Dan Mulut Dengan Media Video Melalui WhatsApp Dalam Meningkatkan Derajat Kesehatan Gigi Dan Mulut Di Panti Asuhan Yos Sudarso Jakarta. *Quality : Jurnal Kesehatan*, *12*(1), 8–13. https://doi.org/10.36082/qjk.v12i1.24

Laily, R. (2025). *Gerakan Peduli Kesehatan Gigi dan Mulut : Edukasi Kesehatan Gigi dan Mulut untuk Anak Prasekolah TK Istiqbal Ngagel Rejo*. 161–171.

Laksono, S., Khairunnisa, I., & Effendi. (2023). Development of Virtual Reality Application for Oral and Dental Health Promotion on Early Childhood. *Jurnal Kesehatan Gigi*, *1*, 22–30.

Meidina, A. S., Hidayati, S., & Mahirawatie, I. C. (2023). Systematic Literature Review: Pengetahuan Pemeliharaan Kesehatan Gigi dan Mulut Pada Anak Sekolah Dasar. *Indonesian Journal of Health and Medical*, *3*(2), 41–61. https://ijohm.rcipublisher.org/index.php/ijohm/article/view/211

Natsir, N. (2024). Implementasi Media Visual Dan Audiovisual Terhadap Pembelajaran Anak Usia Dini Di Era Revolusi Industri 4 . 0 di Sulawesi Barat. *INTEC Jurnal*, *2*(1), 110–115.

Nurhamsyah, D., Mutaqin, B. K., Maziyya, N., Supriat, D., Yuyun, S., & Fitri, R. (2025). Peningkatan Kesadaran Kesehatan Gigi dan Mulut Santri melalui Peran Keluarga Peternak dan Pelaku Usaha dalam Mendukung Pariwisata Berkelanjutan di Pangandaran. *Journal of Community Services*, *6*(1), 90–96.

Oktaviani, E., Feri, J., Aprilyadi, N., Zuraidah, Susmini, & Ridawati, I. D. (2022). Edukasi Kesehatan GEROGI (Gerakan Gosok Gigi) Untuk Menjaga Kesehatan Gigi Dan Mulut Anak Pra Sekolah. *JCES (Journal of Character Education Society)*, *5*(2), 363–371.

Puspitawati, Y., Ulliana, Sulistiani, S., & Fadliyah, N. K. (2022). Promosi Kesehatan Gigi Menggunakan Media Fliphchart Terhadap Pengetahuan Siswa Sekolah Dasar. *JDHT Journal of Dental Hygiene and Therapy*, *3*(18), 21–25. https://doi.org/10.36082/jdht.v3i1.486

Rahman, A. O., & Purwakanthi, A. (2021). Penyuluhan Cara Menyikat Gigi Melalui Media Video Di PAUD Islam Annur Jambi. *Medical Dedication (Medic) : Jurnal Pengabdian Kepada Masyarakat FKIK UNJA*, *3*(2), 64–67. https://doi.org/10.22437/medicaldedication.v3i2.10935

Rini. (2024). Studi Eksperimental Efektivitas Penggunaan Media Video Dalam Meningkatkan Kemampuan Anak Menyikat Gigi. *Ikraith-Humaniora*, *8*(3), 217–224.

Risma, R., Salfiyadi, T., Reca, R., & Nuraskin, C. A. (2025). The Use of Animated Videos in Improving Children'S Knowledge in Teeth Brushing. *JDHT Journal of Dental Hygiene and Therapy*, *6*(1), 87–90. https://doi.org/10.36082/jdht.v6i1.2232

Romundza, F., Harizon, H., Miharti, I., & Novferma, N. (2023). Development of Artificial Intelligence-Based Learning Videos on the Topics of Air Pollution using Lumen App. *Jurnal Pendidikan MIPA*, *24*(4), 801–809. https://doi.org/10.23960/jpmipa/v24i4.pp801-809

Rustono, Romatis, C. B., Purnomo, M., & Jauhar, M. (2023). Perilaku Menyikat Gigi Dan Konsumsi Makanan Kariogenik Pemicu Karies Gigi Pada Anak. *Ilmu Keperawatan Dan Kebidanan*, *4*(2), 518–527.

Santoso, B., Sulistiyowati, I., & Mustofa, Y. (2020). Hubungan Peranan Ibu Dalam Pemeliharaan Kesehatan Gigi Mulut Terhadap Angka Kebersihan Gigi Anak Tk Bhakti Nurush Shofia Mutih Kulon Wilayah Puskesmas Wedung 2 Kabupaten Demak. *Jurnal Kesehatan Gigi*, *7*(1), 58–67. https://doi.org/10.31983/jkg.v7i1.6529

Syarifah, S. N. (2025). *Media Audio Visual Sebagai Media Pembelajaran Untuk Mengembangkan Kognitif Anak Usia 5 – 6 Tahun Abstrak*. *1020*(1).

Theresia, T. T., Louisa, M., Kristanto, C. V., & Putri, S. L. (2025). *Identifikasi dan Modifikasi Faktor Risiko Karies dan Penyakit Periodontal*. Uwais Inspirasi Indonesia.

Tobing, M., Indah, I., Wati, A., Divina, P. Y., & Gunawan, E. (2025). *Efektivitas Edukasi Kesehatan Gigi dalam Meningkatkan Pengetahuan Anak Usia Dini di Ra Kusuma Mulya VII Kediri*. 1000–1010.

Widodo, Y., & Hamid, A. (2020). Effectiveness of Extension Based on Irene,s Donut Android Version Application on Dental and Mouth Health Status. *Jurnal Kesehatan Gigi*, *10*(1), 22–30.

Zahara, E. (2020). Hubungan Perilaku Ibu dengan Rampan Karies Pada Balita di TK Permata Intan Kecamatan Krueng Barona Jaya Aceh Besar. *Jurnal Mutiara Kesehatan Masyarakat*, *5*(2), 7–15.