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# Maintenance of Dental and Oral Health of High-Class Students Using Virtual Reality Box Media (Study at SDN Rejosopinggir Tembelang Jombang)

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**ABSTRACT** One of the dental problems that may have an impact on general health is dental caries. Initial data from dental and oral examinations at the Jatiwates Community Health Center, Tembelang, Jombang, can be used to assess the condition of the disease. Specifically, the rate of dental caries in high school students at SDN Rejosopinggir, Tembelang, Jombang with an average DMF-T index of 5.9 can be used to assess obesity. The DMF-T index is high in the range of 4.5–6.5, according to WHO. The high rate of dental caries in well-off children at SDN Rejosopinggir Tembelang, Jombang Regency in 2023 is the problem that this research tries to address. The aim of this research is to compare the health maintenance practices of upper-class students at SDN Rejosopinggir before and after using the Virtual Reality Box media. This kind of research is called a quasi-experiment and aims to enroll 43 students. Questionnaires were used as a data collection tool. The data analysis process involves collecting findings and presenting them in tabular form. The results of the Wilcoxon test analysis show  $p$  value of  $0.000 < 0.05$  with a pretest mean  $\pm$  SD of  $57.67 \pm 12.216$  and a posttest mean  $\pm$  SD of  $77.91 \pm 11.032$ , which means  $H_0$  is rejected and  $H_1$  is accepted. This shows that virtual reality box media can increase students' understanding of maintaining martial arts.

**INDEX TERM** *Dental and oral health care, virtual reality box, elementary school students.*

## I. INTRODUCTION

In 2019, the World Health Organization (WHO) listed dental caries as one of the health problems that has an impact on general health. Cavities often occur in both adults and children, so because of the high incidence, treatment must be more optimal, especially in an effort to reduce the number of cases of dental caries in children [1]. Efforts to maintain health are an important part of efforts to improve overall health. Dental care should be started early in order to prevent dental caries. Children aged 6-14 years often experience dental caries problems, because at this time their milk teeth begin to replace permanent teeth, which is a critical phase in their dental development [2].

Dental caries is responsible for 45.3% of obesity problems in Indonesia, according to Basic Health Research statistics (RISKESDAS). For all age groups combined, the National DMF-T Index has a mean score of 7.1 however, the mean score for the 10–14 year age group is 1.8. The prevalence of caries in East Java is 42.4%; among children aged 10 to 14 years, it was 41.4% and in Jombang Regency it was 38.98% [3].

The National Action Plan prepared based on the Decree of the Minister of Health of the Republic of Indonesia in 2015 will be the country's main priority in the next five years. The National Action Plan for Health Care Services, which was only implemented in the first year (2015–2020), aims to support the national goal of a caries-free Indonesia by 2030.

In 2020, the National Action Plan (RAN) for Dental and Oral Health Services hopes to have a DMF-T index for all age groups. of 4.1 and the 12 year age group of 1.26 [4].

Caries is a disease of the hard tissue of teeth, including cementum, dentin and enamel. Microorganisms that are active in carbohydrates cause this disease. Enamel, the outermost layer of tooth structure, breaks down first, followed by dentin. Bacteria with the ability to ferment carbohydrates cause dental caries [5].

Children are experiencing the process of growth and development when they are at school, therefore efforts to maintain and improve dental health are very important for them. The development of dental health during adulthood will be influenced by the condition of the teeth in the past [6]. Children who attend school, especially those in elementary school, are at risk of developing dental caries due to poor healthy oral and dental lifestyles. Elementary school children are divided into 2 groups: lower class children, who are in grades 1, 2, and 3, and upper class students, who are in grades 4, 5, and 6. Upper class elementary students have a number of unique qualities, including capacity. rational thinking, realism, curiosity, and a strong desire to learn. They also showed interest [7].

Caries can be caused by various circumstances. Plaque, carbohydrates, microbes and additional elements over time are the main causes of caries. Its hosts are teeth and saliva. In addition, experience with caries, socio-economic status, age, gender, location, and attitudes towards caries are other risk factors that increase the severity of caries [8]. Children's dental caries can have a negative impact on children's growth and development, including decreasing IQ. If this condition continues for a long period of time, the child's quality of life can be disrupted [9]. Eating sweet and sticky foods, cleaning your teeth incorrectly because you are lazy, and not having your teeth checked every 6 months at the nearest community health center or dental clinic are factors that cause dental caries. According to [9] One location that encourages dental health is school.

Children's motor skills can be developed by brushing their teeth together at school, which is a way to maintain their teeth. Brushing your teeth properly and correctly is the next important step in maintaining tooth decay [9]. With the help of modern and fast technology, children's dental health can be maintained. To provide students with fresh experiences and interesting activities that allow them to use virtual reality applications to feel as if they are in the real world, virtual reality boxes are a technology that can be incorporated into the educational process [10]. If children's behavior is less concerned about the health of their teeth and mouth, such as eating and drinking sweets, and rarely taking care of their dental health, this will cause many children to experience caries or cavities [11]. Low parental education will affect parents' knowledge in providing learning to children. Knowledge plays a very important role in improving overall skills [12]. Previously, this research was similar to research carried out by [13] That virtual reality boxes are feasible in

increasing the learning outcomes of elementary school students. These results show that virtual reality box media is proven to be a learning medium that raises students' learning motivation.

Based on data obtained from the Jatiwates Tembelang Jombang Community Health Center, caries cases occurred in 73 children, there were 55 children experiencing caries with a DMF-T index of 5.9 in the high category. According to WHO in [14], the DMF-T index is high in the range 4.5- 6.5. Based on the National Action Plan (RAN) road map for health services in 2015-2020, the DMF-T for children in the 12 year group reached 1.26. Based on these data, the problem in this research is the high level of caries in high class students at SDN Rejosopinggir Jatiwates, Tembelang District, Jombang Regency.

## II. METHOD

Quasi-experimental research, or research on one group without a control group, is the type of research used. This type of research consists of a pretest given before therapy and a posttest given after. Because this method compares the situation before and after therapy, this method can also reveal known treatment results. When selecting a sample, researchers use a direct random sampling procedure, which ignores population strata and offers each member of the population an equal chance of being randomly selected. This research was conducted at SDN Rejosopinggir Jalan Diponegoro No. 08 Rejosopinggir Village, Tembelang District, Jombang Regency.

This research was conducted in August 2023-March 2024. Data processing was carried out after the data was collected, and if the data was normally distributed then paired t test analysis was used to support the hypothesis. When performing the Wilcoxon test with  $\alpha = 0.05$ , the data should not be regularly distributed. After Kolmogorov-Smirnov was used to carry out the normality test, a significance value of  $0.00 < 0.05$  was found. Thus, it can be said that the efficacy test uses the Wilcoxon test as a surrogate test to ensure the data is not distributed irregularly and  $H_0$  is rejected.

## III. RESULTS

Based on the data presented in TABLE 1, presents participant demographics by age and gender. It is proven that children aged 11 years cover 58.1% of the age variable and girls cover 62.7% of the gender variable. TABLE 2 shows that all students in the sufficient category or 67.4% of the total dominate respondents' responses regarding maintaining fitness before using virtual reality box media. TABLE 3 The findings of the study showed that students' knowledge of martial arts after exposure to virtual reality box media was largely categorized as good, with 79.06% of students falling into this classification. This high percentage shows that virtual reality boxing media is an effective tool for teaching martial arts concepts to students. The immersive nature of

virtual reality likely contributes to retention and a better understanding of martial arts techniques and principles.

**TABLE 1**

**Distribution Based on Age and Gender of High-Class Students at SDN Rejosopinggir Tembelang Jombang in 2024**

Characteristic Variables	N	Percentage
<b>Age</b>	10 years	23.2
	11 years old	58.1
	12 years old	13.9
	13 years old	4.65
<b>Total</b>	43	100
<b>Gender</b>	Man	37.2
	Woman	62.7
<b>Total</b>	43	100

**TABLE 2**

**Distribution Dental and Oral Health Maintenance Results Before Using Virtual Reality Box Media for High Class Students at SDN Rejosopinggir Tembelang Jombang in 2024**

Category	Frequency	Percentage
Good	0	0
Enough	29	67.4
Not enough	14	32.5
Total	43	100

**TABLE 3**

**Distribution Dental and Oral Health Maintenance Results After Using Virtual Reality Box Media for High Class Students at SDN Rejosopinggir Tembelang Jombang in 2024**

Category	Frequency	Percentage
Good	34	79.06
Enough	9	20.9
Not enough	0	0
Total	43	100

**TABLE 4**

**Data Normality Test Results Before and After Training on Keskigit Maintenance Using Virtual Reality Box Media for High Class Students at SDN Rejosopinggir Tembelang Jombang in 2024**

Variable	Statistics	df	p value
Knowledge	Pretest score	,251	43
	Posttest score	,122	43

Based on **TABLE 4** The results of the normality test using Kolmogorov-Smirnov show that the pretest value of the sig variable is sig. (p) <  $\alpha$  (0.05) and the posttest value is sig. (p) >  $\alpha$  (0.05). Because one of the data, namely the pretest, is not normally distributed, the effectiveness of using an alternative test, namely the Wilcoxon test, is effective

**TABLE 5**

**Wilcoxon Test Results Before and After Using Virtual Reality Box Media for High Class Students at SDN Rejosopinggir Tembelang Jombang in 2024**

Variable	Category				p value
	n	Min	Max	Mean+SD	
Before Intervention	43	10	60	57.67+12.216	0,000
After Intervention	43	70	100	77.91+11.032	

Based on **TABLE 5** It can be concluded that there is an increase in students' use of virtual reality media boxes to maintain oral health because the p value is  $0.000 < 0.05$ , which means H1 is accepted and H0 is rejected. This shows that there is a significant difference between the period before and after the intervention. 34 upper class students were in the good group after receiving the virtual reality box media, compared to none before.

#### IV. DISCUSSION

Based on the research results, before being given virtual reality box media, the average knowledge of high class students at SDN Rejosopinggir, Tembelang District, Jombang Regency was in the sufficient category. However, field observations show that many students' knowledge about when to brush their teeth, proper tooth brushing techniques, and when is the right time to have their teeth checked is still inaccurate.

The best time to brush your teeth is before bed because when you sleep, saliva production decreases, making plaque acid more concentrated and harmful to your teeth. In addition, brushing your teeth after breakfast is also important because sleep causes plaque to reappear. It is highly recommended to brush your teeth twice a day to avoid the development of plaque which can harm your teeth [15].

According to [16] The correct way to brush your teeth is as follows: first, With the toothbrush held at a slight angle, move the brush head. From top to bottom, start brushing your teeth in a circular motion for 20 seconds, focusing on the front teeth or molars. Focus on the teeth that are most often used for chewing. Gently rub back and forth to clean any remaining food stuck to the teeth. Using the tip of the toothbrush head, clean the inside of the front teeth facing the tongue by moving the brush up and down, in a prying motion from the gum line to the top of the tooth. Use the slightly upright tip of the toothbrush and move it up and down gradually to clean the front teeth. Repeat two or three times. Finally, run the toothbrush under water to make sure it is clean.

Routine dental examinations, at least once every six months, are recommended as a caries prevention strategy. This examination provides rapid identification and action, which can reduce the risk of disease and associated medical costs [17].

According to research [18] It is true that extra care is needed to maintain teeth and improve dental health in school children, especially those in elementary school. At this age, children actively participate in their own growth and development. Because their personal habits and behavior are not yet consistent in maintaining their health, elementary school age children are very susceptible to dental and oral diseases.

This is in accordance with research [19] which shows that students' misunderstandings regarding proper dental care are the cause of the lack of information regarding tooth decay. Apart from often neglecting oral health, students also tend to be less aware of the long-term impact of dental caries and the variables that contribute to it. The results of the pretest questionnaire showed that the average respondent's understanding of the maintenance of kesgilut before being given counseling media was in the poor group.

When the counseling was carried out, the researchers observed that before being shown the virtual reality box media, some students did not understand the maintenance of kesgilut. This was seen when students started doing the pretest, where several students asked their friends and the researchers about the correct way to brush their teeth and when is the right time to have their teeth checked.

From the description above, it can be concluded that maintaining the skills of upper class children at SDN Rejosopinggir Tembelang Jombang before being given media shows that the average student knowledge is sufficient.

Based on the research results, it is known that high school students at SDN Rejosopinggir Tembelang Jombang who have good oral and dental health after receiving media have an average knowledge score in the good range. This is because the media has the power to attract students' attention and increase their understanding of a subject matter, so that it becomes a very influential factor in knowing.

According to research [18], Media-based health promotion for elementary school students has shown that the use of media to improve attitudes and knowledge about health results in more effective learning. This can be seen from the way students respond, increasing knowledge is a closed reaction and increasing behavior or activity is an open response.

L. Green emphasized that health promotion which includes media and educational techniques influences knowledge. The availability of interesting media, as shown in this research through the use of virtual reality box media, is one element that influences knowledge. In the current digital era, the use of learning materials is crucial to help the learning process. This reflects changing times which provide opportunities for educators to educate children in more inventive and creative ways [21].

Media *virtual reality box* is a very useful tool in simulating real experiences via mobile devices. This tool consists of a box made of quality plastic which is designed to support a smartphone.

In the era of digitalization, virtual reality box media is one of the learning media that can be used. Virtual reality box is

an ideal tool to use as a learning medium because it offers an experience that allows users to feel the world directly. The existence of virtual reality box media marks a major revolution in the field of education, according to the findings of various studies. *Virtual reality box* it is a technology designed so that students can use smartphones to interact with the surrounding environment in a simulated virtual world. Virtual reality boxes are particularly appropriate and useful in educational settings, and have a major impact on elementary school students' interest and learning outcomes.

Modern education requires the use of the latest technology-based media. Teachers need to monitor and utilize technological developments with the ability to create virtual reality-based media in the classroom. This media can significantly increase students' interest in learning and academic results. It is hoped that the use of virtual reality box media can be an effective solution in overcoming challenges in the learning process, with the main aim of increasing student learning achievement [22].

Based on the description above, it can be concluded that students' skills at SDN Rejosopinggir Tembelang Jombang are maintained after being given media, with the average student comprehension score being in the good group.

The research results showed that after receiving virtual reality box media, the knowledge of upper class students at SDN Rejosopinggir Tembelang Jombang increased. The right media was chosen to educate the public about maintaining war, that's the reason. Sound and image display media or audio-visual media are included in virtual reality box media.

Student enthusiasm can be increased with virtual reality box counseling media. Students at SDN Rejosopinggir Tembelang Jombang still seemed unfamiliar with new people when the researcher visited, some of them even chose to ignore the researcher when the researcher talked to their friends.

Based on research results [23], audio-visual combines audio and visual elements, so it is known as a viewing-hearing media. The use of this media can enrich and optimize the delivery of material to students. In addition, in some contexts, this media can replace the traditional role of the teacher. This media is able to replace the function of delivering material, while the teacher's job can shift to becoming a learning facilitator who accompanies students when using the media. Students can learn more efficiently as a result.

The use of media in learning has several important functions. The use of this media can facilitate a more productive learning environment, increase students' understanding of the content taught in class, streamline the learning process, and help achieve learning goals [24].

The use of virtual reality box media shows a significant increase in knowledge before and after counseling. This is because this media relies on the sense of hearing and sight, and involves active participation of students in the learning process.

## V. CONCLUSION



Based on the results of data analysis and discussion, the researcher concluded that maintenance of physical activity before using virtual reality box media for high class students at SDN Rejosopinggir was included in the sufficient category. Maintenance of mental health after using virtual reality box media for high class students at SDN Rejosopinggir is included in the good category. There was an increase in counseling results after using virtual reality box media with the average student understanding score in the good category. Health workers must be able to provide advice on how to maintain tooth decay, including when and how to brush teeth, foods that are good or bad for teeth, and the need for regular dental check-ups every six months. This information is relevant for students and their parents.

Future research that wants to maintain dental health using virtual reality box media can use research findings as a guide. By creating other independent variables that have the potential to increase student knowledge, this research can include other health promotion media.

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